

21.C

PURSuing ARMAGEDDON
the
apocalypse

SCANNING THE FUTURE

3BF

Black Thunder

Patriotic Paranoia

Aumageddon

Mad in Japan

Plague Fears

Viral Vengeance

Asteroid Belt

Hit and Ruin

Against Nature

Artificial Selection

NICHOLAS NEGROPONTE

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"Nightclub"; John Hancock, "Peaceable
Kingdom"; Zelig; Predator; Demolition Man;
Eerie understanding of Art Brut.



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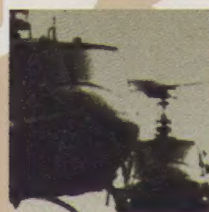
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and to loose the seals thereof?



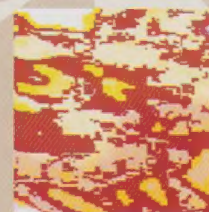
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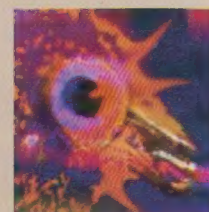
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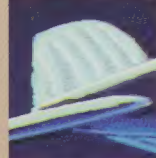
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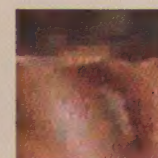
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IN THIS EDITION 21•C considers some of the contemporary visions of millennial fears and obsessions. For centuries, extremist groups have believed that the world is about to end. The year 2000 is no different in inspiring conspiracists and religious fanatics to often bizarre activities.

McKenzie Wark analyzes the growth of conspiracy theories among militia movements in the United States and their fear of the black helicopters of Vietnam covertly regrouping to help form a World Government. Those fears are expressed by conspiracy researcher Jim Keith, profiled by Rosie Cross. Meanwhile in Japan, Azby Brown details the suspicious relationship between media, populace and police against a backdrop of gas attacks and earthquake.

The numerous religious depictions of the world's end regularly feature phenomenal plagues. But as humanity invades untouched rainforests, it is incurring the wrath of nature with brand new forms of disease. Wilson da Silva considers the implications of viral outbreaks, not just in jungles but closer to Western population centers.

From the depths of the jungle to the outer reaches of space, Paul Davies outlines another natural, and perhaps more spectacular, apocalyptic scenario – the possibility of an asteroid hitting Earth with disastrous consequences.

While threats from outer space have often been the fodder for science fiction, the speculative fictions of Philip K. Dick grew from inner space – the paranoid delusions of his characters reflect a mistrust of authority that is re-emerging as the millennium approaches. Certainly a visionary with an apocalyptic bent (his works were the inspiration for *BladeRunner* and *Total Recall*), Dick was largely ignored throughout his lifetime. As George Melrod reveals, Dick's obsession with uncertainty was often fueled by his intake of hallucinogenic drugs. Dick believed that narcotics had become a weapon manipulated by authority. R.U. Sirius, on the other hand, sees drugs as one of the creative sources of today's computer culture; one that is being purged by the contemporary corporate technocracy.

Nicholas Negroponte is part of this emerging technocracy. The founder of MIT's Media Lab, he has been accused of compromising the integrity of his groundbreaking research organization by being beholden to corporate sponsors. A claim he vigorously denies in this 21•C profile.

Media theorist Arthur Kroker also has his share of detractors. Often considered the heir apparent to that other Canadian media theorist, Marshall McLuhan, Kroker is obsessed with the potential roadkill on the infobahn – a gloomy Marxist preoccupation that many find ill-founded.

If technology is the new opiate of the masses, then Amsterdam is overdosing. Having established a digital on-line city in which voting and municipal decision making can occur, it offers a blueprint for the city of the future. Mayor Marleen Stikker explains a new form of democracy.

While cities mutate, bodies reconfigure. Mark Dery considers the implications of artificial selection carried out by performance artists Stelarc and Orlan. A cultural critique, perhaps, and one which tests the notions of posthumanity, but one which pales against the reality of research being done to assist the disabled. As Adam L. Penenberg finds, the future for many people disadvantaged by accident or disease may be a vastly improved one.

In all, enough ideas about the future to keep any reader pondering just what havoc the millennium will wreak.

Ashley Crawford Ray Edgar



COVER: Murray McKeich



sub zero alcoholic soda

sub zero alcoholic soda is a refreshing alternative
with a hint of spice and citrus/lime. 5.5% alc/vol.

THE FUTURE OF TEXT AND INTERACTIVITY IS BEING WRIT SMALL ON THE CD-ROMS CURRENTLY ON THE MARKET. WHAT WILL THE DIGITAL EQUIVALENT OF BOOKS AND MAGAZINES BE LIKE?

about write

BY FRED HARDEN

It was between the third and fourth glass of an indifferent Italian red, when I understood what was happening. Like most drug-induced revelations it wasn't earth shattering, but if you can excuse some imprecision about the moment, it leads to our usual mix of pleasure and technology. This time it's all about reading, and mostly about reading digitally published text.

The occasion was the launch of Microsoft's *Wine Guide* on CD-ROM. The blend of interests ensured that I arrived a little early and politely pinned on my name tag. Even before I was handed a glass, a friendly PR person seated me on the high stool in front of the first of four glowing screens. A Mac, two no-name PCs and a large video monitor took up the four round center tables in the small cafe space.

By chance, I'd started to view the program on a Macintosh. For the record, the *Wine Guide* is an attractive, pleasantly designed piece of multimedia, quirky enough to be interesting. Most of the fun comes from the presenter, U.K. celebrity wine critic Oz Clarke. By using voice-overs and short movies, Clarke takes you from the absolute basics of choosing the right glass, through to a region-by-region world wine atlas. It includes his pick of the best vintages and his ratings on over 700 wines. The extensive vineyard and cellar timeline caters for both Northern and Southern hemispheres. Oz Clarke is an on-screen presence most of the time, and clicking on his image launches small QuickTime movies. I found the dissolves to hide the jumps in his body position mildly irritating, but the text content is in short, easy-to-read grabs, and there's lots of it.

After a glass of wine (maybe two) I moved onto the PC, seized the mouse, and began to dig deeper. It was then I noticed that the same movies (presumably flattened QuickTime but the files aren't hackable on the disk so I'm not sure) looked really dreary. They were pixelated with a coarse, reduced color palette. Screen resolution was the same as the Mac, full 640 x 480, but

on the Mac I was viewing the images in thousands of colors and on the PC, just 256. Later there was a quick demo to the assembled group of us from the third PC, using a large television screen as the display. This gave a dull soft picture, vertically compressed and letterboxed (I assumed it was running from an NTSC video output card on the PC). Three screens with three totally different results, and with more wine came a realization: What we are seeing is another face in the shift to digital.

The content we were absorbing was the conversion of a number of hard-copy based wine publications. Expanded with video and sound, it wasn't a video program and was a world away in content and quality from a linear television documentary. It's a multimedia

CD-ROM and we have to accept that it's a new form of reading from a screen. When you think about it, a multimedia presentation like this uses a lot of the conventions of print. You can choose from

Sonoma County

California, USA

Unlike the compact growing area of Napa, Sonoma is a big, sprawling county with dozens of wine-growing types, ranging from Sonoma Valley to the cool western

To Wright, the circle represented infinity. What better a form, then, from which to create "a temple of spirit," as curator Hilla Rebay requested for the Guggenheim Museum (New York, 1943-59). In the museum, which was designed for non-objective art, Wright **canted** the circle to

FUTURE NEWSPAPERS? The texts on CD-ROM's like Microsoft's *Wine Guide* and *The Ultimate Frank Lloyd Wright* are designed for content rather than style.

an index, or flip (by clicking) from page to page. Unique to the computer, you can make fast word searches, database cross-references, make bookmarks, build lists, and cut and paste the text for print-out. Like moving through a book, the reader is in control of the pace it is all presented – even when it is enhanced with small movies and sound.

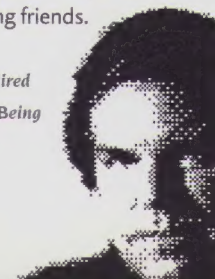
OK, before you call 'big deal' (or 'small revelation'), consider the Internet, specifically the World Wide Web.

Absorbed in the Web for the last few months, with the only respite being from magazines and books about the Net, I've been reading and writing text on computer screens. Sometimes up to 18 hours a day. Although I've been talking up and demonstrating the potential multimedia aspects of the Web, what I've been browsing has been mostly text and pictures. Scrolling that black text on a gray background broken up by small pictures, it doesn't compare to a singing and dancing multimedia CD-ROM.

Coming face to face with this fresh load of multimedia text forced me to ask some questions. How is the interactive TV we've been promised going to look? Like a CD-ROM title? Not presented on a television screen surely, you'd never read the text. Is it inevitable that we are going to read text on computer screens in preference to paper? Probably. Newspapers and newsletters aren't read for style but for content. They would seem to translate ideally to the Web. What will the digital equivalent of our books and magazines be like? There's a lot to suggest that they might look like these Microsoft releases. At least for coffee table, mass-market titles such as the *Wine Guide*.

It wasn't just the wine that prompted the questions; I've been reading Nicholas Negroponte's *Being Digital*. The book is an expanded collection of 18 of his *Wired* magazine columns and comes heavily out on the side of the computer monitor against the television screen. There's resolution and digital flexibility for a start. In fact his thesis is that digital 'bits' will win out against 'atoms' anytime. Shifting a magazine full of atoms around the country may not be as efficient as just porting the information content to a screen, but I like getting my nicely printed 27•C to have and to hold (as I do my *Wired* for that matter). Having absorbed Negroponte's arguments over the last two years through that magazine, it's convenient to have them collected here. I can recommend this book as perfect material to convert your analog thinking friends.

BEING WIRED: Nicholas Negroponte's *Wired* columns get the compilation treatment in *Being Digital*. But why not a CD-ROM release?



ROBERT MOSES
ONE GRACIE TERRACE
NEW YORK, N. Y. 10028

June 6, 1979

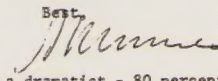
Mr. Arnold H. Vollmer
211 E. 70th St. - Apt. 25H
New York, New York 10021

Dear Arnold:

I read the FWLW book last night when we were back at our digs and found it loyal, appealing, and a bit too worshipful for me. The pictures of Frank are excellent but too posed. This book raises the same old questions which have always puzzled and plagued Frank's friends - how much is genuine architectural genius and how much fakery? I say 25-75%. Their high marks in the arithmetic. I wouldn't want to defend such arithmetic in the court of last resort, wherever that may be. I certainly would not hope to get anything like these marks if applied to me in the form of how much accomplishment and how much pure cussedness.

Love to your bride from both of us.

Best,



P.S. - I rate Shakespeare as a dramatist - 80 percent genius and 20 percent fakery.

ULTIMATE ARCHITECTURE: While Frank Lloyd Wright's theories are available on CD-ROM, a more humble text, *About Wright*, consists of recollections on the architect.

It sent me to the cupboard where I had a review copy of another Microsoft title, *The Ultimate Frank Lloyd Wright*. I had been hoping to find an architect to review it, but my interest was now focused and I installed it one night at home. I started the program and didn't emerge for hours. From the tasteful opening music (composed by Jeff Hixson who was also the director and designer of the project) this promised more than a coffee-table experience. Don't try and run it on a slow PC as it's hungry for speed and memory, but it's almost worth upgrading for (you needed an excuse didn't you?). It's almost a case of over-reaching - the Windows medium can't keep up with this yet. There's a lot of pictures (some look like bad video stills), a lot of text, all integrated across the disk. You can be reading about Wright's philosophy and get sidetracked into the application of it in a series of photographs.

I wondered if the two 3-D programming sections were gimmicks until I tried them. There are three computer-generated QuickTime movie walkthroughs of two Wright houses and a commercial office building. Coarse and jumpy, but it's as close to the experience of being there as I'll ever get. If you've absorbed enough of the Wright 'open grid' lessons, you can apply Wright-style doors and window elements to build your own 3-D rendered Wright house. This can then be rotated and viewed from different angles. I thought it was ironic that the CD-ROM, which was produced by Byron Priess, was part of their Digital Bauhaus series. Wright often raged

In the process of putting information on screen we are going to have a number of formats that aren't sure what they are.

The stage we are at today is for screens that mimic paper.

against the Bauhaus designers (especially Gropius) who he felt were "foreign" and "strangling the flow of expression."

Defining this particular CD-ROM production as a multimedia presentation of the material is an accurate description. It couldn't happen on-line, only on your PC. Yet it's not the same as the *Wine Guide*. In the process of putting information on screen we are going to have a number of formats that aren't sure what they are. The stage we are at today, is for screens that mimic paper.

Negroponte makes a point about the need to make a switch between information transmitted through the air, and that carried by cables. It makes more sense to clear the broadcast air of bandwidth-hogging television signals and send them by cable. We can then use that space to allow services such as telephone, carried now by cable, to reach things that move around like boats, cars and people. Can I suggest that we should be thinking about our paper-based information in the same manner? Some forms you need to have while moving around, and some would be better, faster and cheaper if delivered digitally.

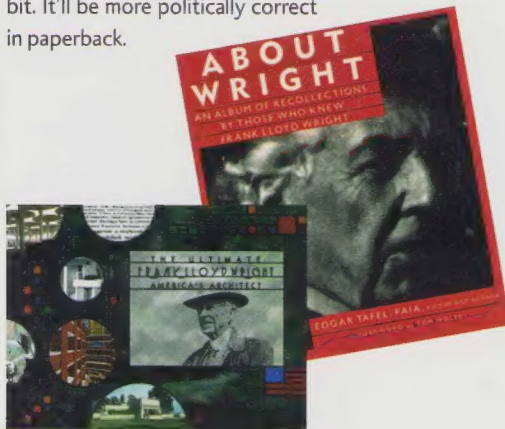
This challenges the expense of paper-based printing, but the technology to cut costs is starting to appear with direct-to-press processes. These were used for the recent special edition of *Scientific American* on *The Computer in the 21st Century*.

Using vegetable inks on chlorine-free paper, it didn't look all that pretty, but it conveyed the content in a portable, cheap format, just fine. Making that kind of printing look better and cheaper is attracting a lot of industry R&D money at the moment. Because we've seen how good printing and paper can look, we know what we are working towards. The future of screen publishing isn't as easy to propose.

Just a parting thought. The significant number of computer geeks with glasses is not an accident. Ask an ophthalmologist. Staring at monitor screens all day puts a strain on eyes that evolution has prepared for something else. It was certainly not 10 hours a day of fixedly staring, from less than an arm's length away, at a small flickering monitor. Do you do eye exercises?

Join me as we slouch bleary eyed towards the future of reading. ■

However, if you're standing in the bookshop, wondering if the book is worth the money, read the acknowledgements pages. They reveal a little about the MIT Media Lab and a lot about Negroponte, but they make the content sound far more pretentious than it is. The book is presented as bald black-and-white text with no graphics, atoms in the purest sense. If you subscribe to the medium being the message, this book doesn't say anything. I'd have happily paid Negroponte a few dollars direct to receive the file electronically to print out. It would have made quoting him here a lot easier and would immediately cut the pompous 'here's my Book' bit. It'll be more politically correct in paperback.



About Wright came in as a paperback, although it was probably in hardback when it was first published. This square format, simply illustrated, all black-and-white book certainly is not pretentious. The printing quality of the letters and photographs just holds up, but it's definitely not a glossy coffee-table book. It consists of documents and recollections about Frank Lloyd Wright, collected by Edgar Tafel. Tafel is also an architect and was an apprentice to Wright in the period at Taliesin, the architects commune that sustained Wright financially and psychologically through the '30s. The book has a foreword by Tom Wolfe who never knew Wright (who died in 1959 aged almost 92), but Wolfe has obviously been caught by the master architect's passion and idealism. The recollections in the book tell a warts-and-all story but from a respectful distance.



TODAY'S TECHNOCULTURE, WITH ITS ROOTS IN THE PSYCHEDELIC '60S, DOES NOT SIT WELL WITH THE CORPORATE CULTURE THAT HAS TAKEN OVER THE COMPUTER INDUSTRY.

chips'n'trips

BY R.U. SIRIUS

One of the oddest and least understood aspects of '90s technoculture is the connection that's been made by some cyber-enthusiasts between computers and psychedelic drugs. I recently spent a weekend at a computer conference, trolling the long, aesthetically-dodgy, brightly-lit rows of hardware and software vendors. What on Earth could this culture of Republican, just-say-no, suit-and-tie, archotypically vulgar salespersons have to do with the wild expansiveness of the psychedelic vision?

Before presuming that the imposition of a small tribe of spaced-out misfits on the fringes of the computer industry is mere fallout from the enthusiasms of Dr Timothy Leary, it behooves us to examine the roots of the personal computer industry. The hacker subculture of the '70s that produced the PC was firmly rooted in the Counterculture. Preceding the hardware hackers, whose new left-influenced, anti-authoritarian political attitudes are trumpeted in Stephen Levy's book *Hackers*, were the phone phreaks. Phone phreaking emerged in the late 1960s as part of the Yuppies' program for total psychedelic cultural revolution. Free phone calls conjoined with shoplifting and other petty crimes became something of a lifestyle. Hardcore "freaks" (tougher, more sophisticated hippies preferred to label themselves freaks) leaned heavily on anti-capitalist rhetoric as justification for this parasitism.

But the primary impulse came from the boundary-destroying effects of frequent, high dose, psychedelic ingestion. Freaks didn't merely *rebel* against external boundary distinctions like the cash register, the turnstile and the "long distance" call; their minds were in such a blissful blur that they couldn't see boundaries. Graham Nash sang to the immigration man, "I won't tow your line today. I can't see it anyway," and Janis Joplin opined that "it's all the same fuckin' day man."

These attitudes, and the hunger for total boundary-breaking liberation that they represent, infected youth culture at large throughout the late 1960s and the early 1970s. It's within this context that we find the initial hackers working on accessible "thinking machines" for the people.

Flashback...

Ted Nelson, the infamous philosopher of hypermedia, is circulating his first book, *Liberation Machines*, and beginning his lifelong pursuit of the ultimate cosmic informational system, the machine that links everything to everything else. "I believe that all is one," Nelson would tell *Mondo 2000* in 1990. At the same time, Stephen Jobs is dropping acid in college with his best friend and fellow science fiction enthusiast, Dan Kottke. They are already dreaming of handheld personal computational machines. Years later, with money made from building and selling blue boxes (phone phreaking devices) and, allegedly, marijuana, Jobs and fellow hipster Steve Wozniak will roll out the first personal computer. As the new economy is born, there is what law enforcement officials like to call "the sickly sweet smell" of marijuana in the air.

One hacker entirely coded
an alpha version of one
of the world's most
influential software packages
in one night during a
250 microgram LSD trance.

Flash Forward

Perhaps instead of speaking of a cutting edge, we should speak instead of blurring edges. The evolution of computer technology has continued and expanded around a notion of convergence and synthesis, reflecting and accelerating a postmodern culture also involved with convergence, synthesis, fluidity and flux. In this case the flux of personal identity and situational ethics. Postmodernism has been described by author Morris Berman with the words "Everything solid melts into air," a very psychedelic vision indeed.

The psychedelic influence on the development of information technology is one of the secrets of the deep

hackers who built the industry. (One hacker, who maintains his anonymity, told me that he entirely coded an alpha version of one of the world's most influential software packages in one night during a 250 microgram LSD trance. The next day he tested it and it worked.) The new world of creative computer-users includes a large number of open psychedelic enthusiasts. Ravers, technopagans and a host of other "new edge" denizens, including Mark Pesce – the designer of VRML (the virtual reality programming language for the World Wide Web) – preach from the psychedelic gospel.

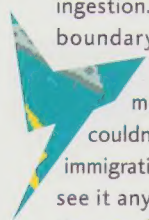
Indeed, it all makes a great deal of sense. The effects of psychedelic drugs are largely attributable to an excess of vasopressin and a depletion of serotonin in the brain. This results in a literal overload of information firing across brain cells. Once the tripper gets past the initial confusion, information overload becomes a deeply self-reflective, ecstatic experience. Is it any wonder that there is an intuitive desire among acid heads to put the pedal to the metal when it comes to speed and density of information?

Bad Shit

Now, the personal computer industry is at the absolute center of late-20th-century hypercapitalism. The sickly sweet smell of marijuana has long since been replaced by the distinctly unpleasant odor of corporate urine-testing. The postmodern, neo-psychedelic, jump-cut aesthetic has already been explored on behalf of *boundary-affirming* cultural owners like Viacom (i.e. MTV). It's now poised to infect the cultural nexus of the Net with brilliantly realized trippy *advertising* for sugared soda water and other consumer distractions. With armies of lawyers poised to defend intellectual property rights, with companies like Microsoft and Apple being run like armed camps, and with attempts to impose censorship on the naturally spontaneous body of the Internet, the response to the boundary-dissipating nature of information technology has been a simple redoubling of Big Brother-style efforts at control. And there's the rub.

The cyberdelic culture has one thing right. The digital age is psychedelic.

Only problem is... IT'S A BUMMER! ✨



The psychedelic influence on the development of information technology
is one of the secrets of the deep hackers who built the industry.

The sickly sweet smell of marijuana
has long since been replaced by the distinctly
unpleasant odor of corporate urine-testing



free invention
of situations that
are worthy of radical
new desires

FEATURING THE MOST AGGRESSIVE THINKERS OF THE NEW TECHNOCULTURE, THE
1995 VIRTUAL FUTURES CONFERENCE OUTLINED SCENARIOS FOR THE 21ST
CENTURY — FROM ARTIFICIAL INTELLIGENCE TO PROZAC DEPENDENCE.

grepping

by McKenzie Wark

■ "We have gathered you here this weekend to bury the 20th century and begin work on the 21st," boasts the conference program for Warwick University Philosophy Department's Virtual Futures conference. "We are the children of the 21st century and live already in the future unknown, uncovering every day vast new landscapes for exploration." The conference organizers, Eric Cassady, Otto Imken and Dan O'Hara, add an amended quote from Marx: "So far, philosophers and artists have only interpreted situations; the point now is to transform them, to create situations worthy of our desires." The new breed of philosophers seek earnestly for the new. But it's an old 'new' they seek. The kind a lot of people thought buried in the rubble left by the Luftwaffe's contribution to 'total war' in Coventry, Enola Gay's atomic gift to Hiroshima, and in the labor camps of Belsen and Dachau or in Stalin's Siberia. After the postmodern hangover, the hair of the dog. Let's try once again to make new life.

bury the 20th century

One might have expected more participants discussing the Internet, particularly Web stuff, and more multimedia, but both appear pretty underdeveloped in the U.K. The uptake of both the Internet and CD-ROM lags behind both the United States and Australia. Philips has managed to get its rival CD-I technology onto the shelves and into the shops, which may account for the lack of a CD-ROM industry. The consensus is that CD-I isn't a world-beater and won't last. But you never know. Anyway, for a techno-futuristic conference, the audience seemed at times a little like those quaint streets of Coventry. When asked by a speaker how many had Net accounts, a tiny minority put up their hands. Discussion of cyberspace at Virtual Futures was conceptual, rather than practical.

Virtual Futures brought together at least three different microcultures. There's the techno-underground; the sweeping new police powers created by the Tory regime have led to crackdowns on the outdoor 'rave' scene, and put a bit of spine into its anarchist wing. Then there's the international performance art jet set; the conference brought together Stelarc and Orlan, two of the most interesting artists currently exploring the relationship of the body to technology. Lastly, there are the intellectual descendants of the French philosopher Gilles Deleuze and the radical psychiatrist with whom he wrote a number of books, Felix Guattari.



20 ► "He is the Golem of the electronic body." ARTHUR KRONER

26 ► "We will be able to create new 'transgenic' creatures of unprecedented nature and qualities." JOHN HARRIS

the future

bubble of de-centred awareness

virtual security

a tangled web of people and ideas

and directions

Marilouise and Arthur Kroker, like most of the speakers, have books out. In their case, they also edit and publish their own series. The Krokers are a sort of Canadian answer to Baudrillard. They opened the show with a very Baudrillard-derived display of hyperbolic cyber-rhetoric, chopped into sound bites and interspersed with videotapes of things like their holiday at Disneyworld. Their style could be called predictable excess: the shock of the banal, the recline of the West, the will to virtuality, retro-fascism, flesh-hacking, schizoid culture, the posthuman body, the virtual class. You can find all of this in Arthur Kroker's books *Data Trash* and *Spasm*. It's basically '80s cut-up, appropriation, scratch aesthetics applied to '90s theory- and cyber-market jargon. They do it almost as well as the advertising agencies Silicon Valley hires to do their *Wired* ads. The difference is the rather quaint tone of political resistance laced through their work – keep the Net free, and all that. It's a pity the Krokers aren't quite up to date on the details. Newsflash: the Net backbone was privatized months ago.

the will to virtuality

Brian Massumi is one of the leading interpreters of the thoughts of Gilles Deleuze and Felix Guattari. His book *A User's Guide to Capitalism and Schizophrenia* is hard going at first, but is mostly exactly as advertised. Appropriately enough, he offered a reading of what Deleuze and Guattari mean by the 'virtual.' It has nothing to do with head-mounted displays or funny gloves. The traditional view of how change happens imagines a uniform and continuous force heading into the future, that can be either

formed or diverted by rules and actions. Massumi offers quite another view, taking his lead from Deleuze and Guattari, in which we are to think first of a principle of radical and unpredictable change and variability which erupts of its own accord in new forms and movements. It's a bit abstract, but it is important for understanding concepts of change based on thresholds and bifurcations, either in nature or culture, where radically new patterns emerge seemingly out of nowhere. The virtual is this sense of infinite possibility lurking within the actual. That's the sense of 'virtual' in the title of the conference too.

radical and

unpredictable change

and variability which

erupts of its own accord



20 ► "We are data trash. And it's good." ARTHUR AND MARILOUISE KROKER

telesthesia

perception at a distance

making oneself up as one goes along

Having written about the cybernetic fiction of William Burroughs and like-minded writers in *The Soft Machines: Cybernetic Fiction* and the forthcoming *Telepathies*, David Porush now heads an artificial-intelligence project designed to make computers understand the language of storytelling. His paper proposed that the brain and the nervous system are not a machine; they don't represent the world to 'me.' No mind/brain split. Rather, he agrees with Guattari in calling the nervous system 'autopoiesis,' which is something like making oneself up as one goes along. The nervous system doesn't just relay messages, it remaps and rewires itself in relation to its environment. Porush wants to get beyond the limits of a consciousness shaped by the alphabet. His next book, *Telepathy*, looks at pre- and post-alphabetic cultures. Perhaps this view of the nervous system is meant to ground the difference between the alphabetic and the non-alphabetic consciousness in some kind of material understanding of how the nervous system is supposed to affect the way it adapts and maps itself. Porush has his eye on a post-alphabetic future, of the kind glimpsed in William Gibson's *Neuromancer*, where images can be ordered and made meaningful without recourse to an alphabet, as they were for the ancient Celts, for example.

Scot Bukatman's book *Terminal Identity* puts cyberculture in the context of science fiction since the '60s. His new work looks for a longer historical trajectory for some of the images that fascinate us today. Bukatman's starting point is the modern experience of human perception as being unanchored in lived

space and time. What we mistake as being 'realism' is just an effect of technologies we've become used to. He is particularly interested in kinesthesia, the perception of movement, although a lot of what he has to say deals just as much with 'telesthesia,' or perception at a distance. He looks at things like magic-lantern shows, automata and rides, not just at the machine world 'colonizing' the body (in Jonathan Crary's terms), but also as compensation for the lack of stable grounding in modern life. He follows the way the intense experience of vertigo, of standing on the abyss, is created by a series of technologically advanced machines of perception. He draws a link between 19th-century landscape painters who used new cobalt pigments to construct sublime landscapes, and the special effects of Douglas Trumbull that figure in 2001, *Close Encounters* and *Blade Runner*. New media appear in this history as recreating that sublime feeling, after we become bored with the last round of machine-made perception. All very useful stuff for charting the trajectory of the evolving image-culture back a bit more than the usual 20 minutes into the past.



78 ► "The SF writer sees not just possibilities, but *wild* possibilities. It's not just 'What if...?' It's 'My God; what if....'" PHILIP K. DICK

James Der Derian, the author of *On Diplomacy*, has now shifted his focus toward security issues, or rather, to what he calls "virtual security." He points out that Iraq ran computer simulations of its Kuwait invasion before launching its attack, and that General Norman Schwarzkopf is also a keen advocate of these hi-tech wargames and up until Desert Storm had built his career around them. One of Der Derian's telling anecdotes is that as Schwarzkopf had a simulation running at the same time as his operation, papers sent to his office had to be stamped either 'real' or 'simulated.' But Der Derian thinks that virtual security is characterized more by the *lack* of operations like Desert Storm. The U.S. military, he thinks, wants to deter by simulating its power. He suspects its openness to his inquiries and willingness to show him around is part of a new strategy to use the media to get out the message of American power. Which is not to say the new look military has gone 'soft.' As Desert

Storm showed, it is the deadly combination of computer-based infomatics and on-the-ground logistics that characterize the virtual security state

Manuel De Landa's book *War in the Age of Intelligent Machines* is useful background reading for Der Derian's current work. De Landa himself has moved on. His next book, *One Thousand Years of Non-Linear History*, considers human existence from the point of view of mineralogy and mining, and the interaction between industrialization and the creation of new milieu for micro-organisms. Since then he's moved on yet again to look at new ways of thinking about the economy. Throughout, De Landa combines an analytical mind with unique and startling perspectives. His *War in the Age of Intelligent Machines* is written from the point of view of an imaginary robot-historian of the future looking back on how it would construe human-machine interactions. His marathon paper at Virtual Futures unpacked some of the most difficult concepts of Deleuze and Guattari. It attempted to explore the new abstract concepts being developed in the sciences and mathematics and see what they might contribute to rethinking philosophy and the social sciences. By working with the most fundamental notions of matter, energy and abstraction, De Landa opens up new ways of thinking; his is a world of infinite flux and potential, not one of fixed metaphysical forms. De Landa's work doesn't fit neatly into any academic box, which is what makes it so fresh. He's certainly a rigorous thinker, but makes his living as a computer animator rather than a teacher. And why not? Exercising your brain against the aesthetics and algorithms of design is not a bad way to limber up for a new look at philosophy.

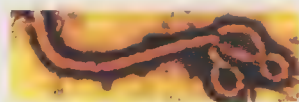
new milieu for micro-organisms

Peter Lamborn Wilson, author of *Essays in Islamic Heresy* and an editor of *Semiotext(e)*, seemed to be on the program as the token debunker. Wilson sees cyberhype as part of a long tradition of religious suspicion of

the body. As William Gibson's cybercowboys might say, the body is 'meat,' the mind has to be freed from it, if not through spiritual means, then through technological ones. He's critical of attempts to define 'information' as something disembodied, fleshless. As if information, passing through machines, was pure spirit that could interpret itself to itself. He insists that the body is still the basis of all wealth. Where he goes astray is with the assertion, popular at this conference, that this is an age that denigrates the body and privileges the mind. Body building, steroids, plastic surgery and supermodels immediately come to mind – all those signs of the total fetishization of the body. It's more that the split between mind and body has been institutionalized, even within science itself. That's why work like that of David Porush is so important, in showing the linkages and flows between body and mind, and why De Landa is so interesting on the way matter, information or form already interact at the level of physical reality. The issue is not whether to value body or mind, physics or psychics, but to understand how Guattari's "abstract machines of subjectivity," work and how they have their moment in history alongside the machinery of war and production that De Landa and Der Derian have addressed in their books.

Steve Pfohl wants to understand this abstract machine of subjectivity from the inside. How does our massive and constant immersion in the bubble of decentered awareness created by the flow of information affect our understanding of, and relations with, the world? The title of his book, *Death at the Paradise Cafe*, pretty much sums it up. Pfohl wants to get behind the endless reproduction of empty simulacra by putting the body and its limits, its differences, back in the frame. He writes and speaks in a freewheeling prose that actually does what the Krollers only promise to do: finds the art of telling new stories in a language that is made for us, that we cannot freely choose for ourselves.

bubble of de-centred awareness



64 ► "The conditions of the modern world are uniquely favourable to the rapid global spread of infectious diseases." PROFESSOR J. MANN

Camilla Griggers is interested in psycho-pharmacology. This is the sort of thing that happens to people who read Deleuze and Guattari: they start looking into the material details of the 'machines' that make us function. In this case, chemical machines. She is interested in the way drugs like Prozac have been used as "surge suppressors," as "limits to flux" that "put a break on desire." The desires and surges in the bodies and lives of women in particular, she suggests, end up being chemically "suppressed at the neurochemical root of feeling and memory" through the prescription of drugs. And not only through drugs, but through a whole management of aberrant female lives. This culture produces aberrant lives with its extreme and conflicting demands, then creates medical and psychological machineries to 'manage' them. Prozac, for example, is the perfect drug for making women fit in with the demands of corporate office life. On Prozac, they become less emotional, more active, more confident, nauseous, insomniac and unorgasmic. There are already eight million Prozac users world-wide. Griggers hints at a feminism that might look for alternative forms of creating new and unique female subjectivities rather than suppressing urges and surges and milling them into the mold required by work and consumption. Her forthcoming book is called, appropriately enough, *Becoming Woman*.

**what did those bit-heads know
that gibbon didn't?**

Alan Moore is best known as the author of the graphic novel *The Watchmen*, which contains a classic line about the imminent future: "an impending world of exotica, glimpsed only peripherally." His contribution to *Virtual Futures* was a long prose poem about television, which he watched instead of having a mid-life crisis. Some of the audience decided he should have had the mid-life crisis. Some decided the piece *was* the mid-life crisis. This divided response was most likely a sign that the prose poem is a lost art form. The piece was not just about television, it was from the point-of-view of *television* – as if it were a latter-day god. It contained the great line: "I am the silence of the will."

Pat Cadigan's cyberpunk novels are not as well known as William Gibson's, but *Synners* is definitely a worthy contribution to the genre (or should that be the 'marketing category'?). She told an interesting anecdote about being at a convention of computer-science people with Gibson, discussing the near future. Gibson was adamant that the Eastern bloc would continue into the near future. Some of the computer geeks were skeptical. A few months later, the Berlin wall was down. It was all over. What did those bit-heads know that Gibson didn't? They had been grepping the Net. They had heard the whispers. The Hungarian edition of Gibson's *Neuromancer* novel contains a very brief apology for getting it wrong. Says Cadigan: "He was just writing a story. Deal with it."

Virtual Futures wound up with two of the University of Warwick's brightest stars doing their new thing with some of their students. Nick Land is the author of a great book on French post-surrealist writer George Bataille, called *The Thirst for Annihilation*. Sadie Plant's first book, *The Most Radical Gesture*, was on the Situationists. Her next one is on cyberfeminism. Plant argues that women are better prepared than men for the brave new world of cyberama, because the existing patriarchal world forces women to become self inventors of extreme and supple subjectivities. She sees a cultural shift toward fractal and elaborate forms of self, and one that women can lead and flourish in. Taking a cue from Deleuze, her work considers possibilities for, rather than the limits to, the new. Land and Plant and their students offered a continuous reading of high-speed, hyper-cut-up prose that either came across as a Hugo Ball nonsense poem, or as an ever-shifting, pulsating stream of micro-possibilities for thinking, any instant of which might fire off in your brain or drift past unnoticed. With a mesmerizing video loop and cool techno music supplied by their own DJ, it was quite a show;

a tangled web of people and ideas

and while Plant and Land cop a lot of flak for their flakiness and celebrity, why shouldn't high theory meet performance art?

Put it all together, and what have you got? A tangled web of people and ideas and directions. If the hardcore technology is in the U.S., and the state-subsidized new media art is in Europe, what's happening in this little corner of the U.K. is an attempt to make new concepts, hence these conferences and the new Centre for Cybernetic Culture at Warwick, where Plant presently works. In contrast to the U.S. scene, there is a real connection between new forms of street culture and new thinking. As William Gibson famously said, "the street finds its own use for things." So staying close to the free invention of situations that are worthy of radical new desires is a good strategy. The focus on the work of Deleuze and Guattari, even though some of it is decades old, is also productive, but nobody has tried harder to break with the old paradigms of order and to make out an anarchist philosophy of free virtuality. As we speed into the new, they demonstrate that our thinking must not only become more abstract, but also more material. ■



54 ► "The street finds its own use for things." GIBSON



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A D V A N C I N G A U S T R A L I A

IN HIS IMMACULATE ITALIAN SUIT, NICHOLAS NEGROPONTE LOOKS MORE LIKE AN INTERNATIONAL FINANCIER THAN ONE OF THE LEADING THINKERS OF THE INFORMATION AGE. HIS NEW BOOK, **BEING DIGITAL**, MAY HAVE PROPELLED THE HEAD OF MIT'S MEDIA LAB INTO THE MEDIA SPOTLIGHT BUT IS HE A TRUE VISIONARY OR JUST A WELL-CONNECTED HYPE MERCHANT?

NET PROPHET

NICHOLAS NEGROPONTE is dyslexic. Rather ironic for someone who lives and breathes media, and spends most days reading and replying to the torrent of information finding its way into his office from the four corners of cyberspace.

Until recently Negroponte had been a back-room corporate schmoozer. Now, through his column in *Wired* magazine and his new book, *Being Digital*, the founder and director of the Media Lab at Massachusetts Institute of Technology has grown into an info-prophet; revered by cyberpunks and the darling of a largely unquestioning media. He makes bold predictions about the digital revolution and brooks no criticism. He's confident and audacious, and if challenged, is fond of saying: "If I'm wrong, wait 10 minutes."

In 1989 he predicted that by the mid-1990s, the primary interface between people and computers would be speech. Well, it's not here yet, and it's not 10 minutes away either. But that doesn't faze Negroponte.

The corporate cognoscenti also appear to adore Negroponte. There are more than 75 corporate sponsors of the Media Lab, including Sony, IBM, British Telecom, Intel, Reuters, Hughes Aircraft, News Corporation and The New York Times Company. Of the US\$20 million the center costs to run annually, only \$1 million comes from MIT, to pay for the teaching of media arts and sciences, for which the lab offers graduate degrees. It also has a \$30 million endowment. In comparison, other MIT faculties receive between 6 and 10 per cent of their funding from outside sources.

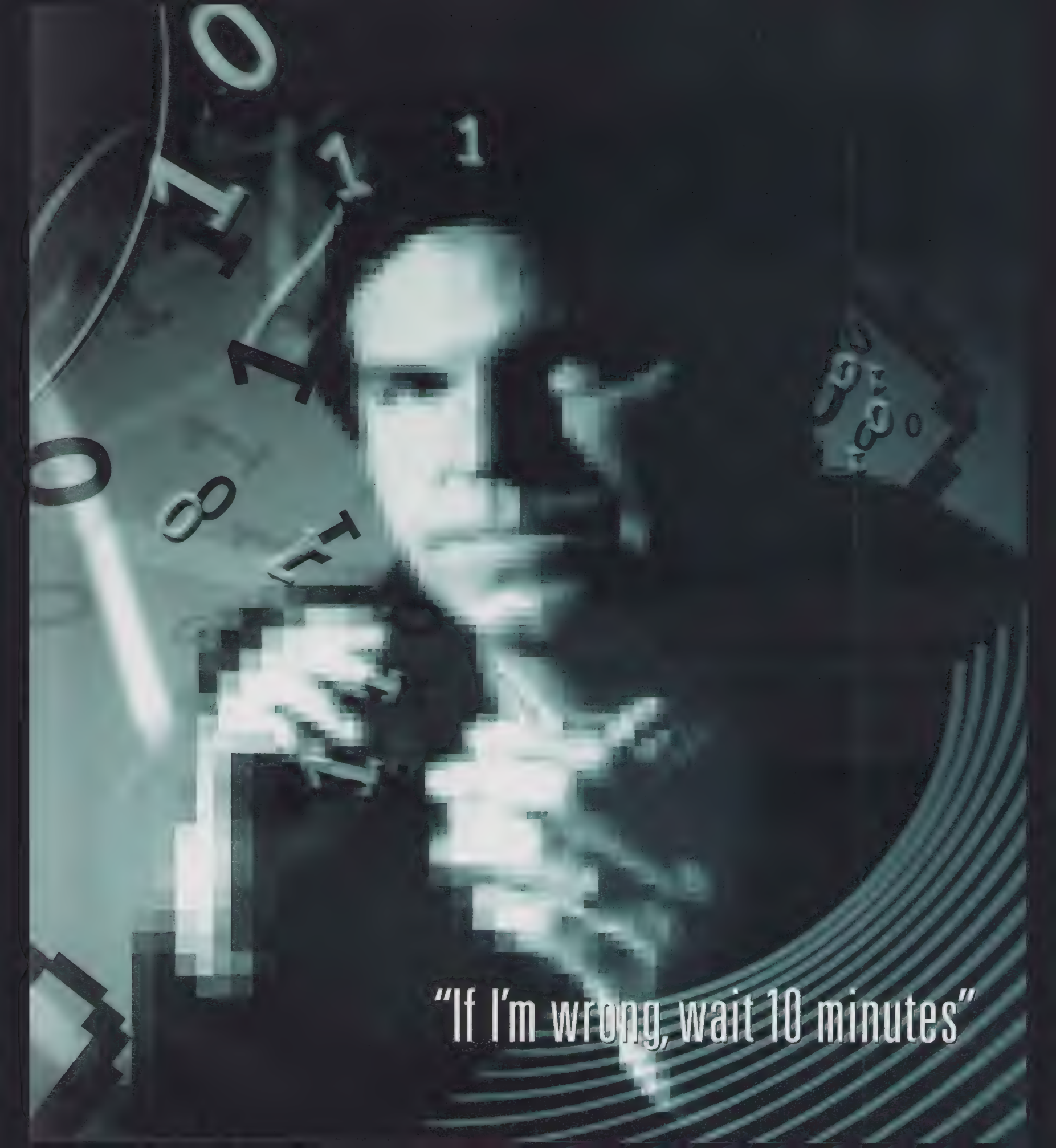
"I know basically every media mogul on a first name basis," Negroponte boasts. Less wealthy faculties at MIT regard the Media Lab as a captive of big business, but Negroponte dismisses this: "Obviously, you can sign a lousy agreement and be the servant of anybody, industry or government. But industry can be your best source of support, if they understand the concept of out-sourcing basic research."

It can get tricky, as Media Lab researcher Henry Lieberman admits: "It's a trade-off. This gives us a bit of immunity from political whims, but on the other hand, it takes a lot of work to maintain relationships with the huge number of sponsors who come."

Negroponte is the epitome of the info-Utopianist. The digital revolution will eventually sweep away all of humanity's troubles, he says. Maybe not today, maybe not tomorrow, but eventually. Just wait another 10 minutes. There'll be no 'information poor' in the future, either; today's children are technophiles and will be tomorrow's plugged-in adults, and only their parents will be the digital homeless. What do you do if you're growing up sans computer, in a New York ghetto or a São Paulo slum? ask his critics. Don't get pedantic, says the man. It's only a matter of time.

by Wilson da Silva

Illustration by Assunta Russo



"If I'm wrong, wait 10 minutes"

NEGROPONTE is a puzzle: a tenured professor with no Ph.D. he doesn't even have a degree in anything relating to cybernetics. Negroponte's background is in architecture.

He came to MIT in 1961 and after graduating in architecture, joined the faculty specializing in the then nascent field of computer-aided design. After a series of visiting professorships, Negroponte founded the influential Architecture Machine Group at MIT, a combined lab and thinktank that he oversaw from 1968 to 1982, which was responsible for radical new approaches to human-machine interfacing. He wrote influential books on the subject, including *The Architecture Machine* and *Computer Aids to Design and Architecture*.

Negroponte went from computer-aided design in the 1960s to computer graphics in the 1970s, and was feted by governments eager to hear his message of a digital future. Even critics admit he was ahead of the pack when it came to the implications of the digital age and the resulting convergence of media. "He was talking about this in the 1970s, when everyone else thought it was silly," says Michael Dertouzos, head of MIT's Laboratory for Computer Science. "For that he gets full credit."

But that's as congratulatory as Dertouzos gets. "Vision is the thing he's excited about," he adds. "The achievement, the accomplishment, is where he is weak. True progress occurs when people combine vision with the 'can do' aspect, and think through the social, political and technological implications."

Negroponte as the slick corporate operator seems to get up the nose of a lot of the die-hard computer engineers at MIT, most from faculties not quite as generously funded as the Media Lab. Negroponte peddling the digital gospel without a degree in computing is a particular irritant.

However, in 1976, when everyone else in computing science was struggling with establishing systems or network protocols, Negroponte was proposing a random access multimedia system that would allow a user to converse with long dead artists – what today might be called CD-ROM.

This idea led indirectly to the Media Lab. He applied to the U.S. National Endowment for the Arts with just such a proposal. The then president of MIT, the late Dr. Jerome Wiesner, a former science advisor to President John F. Kennedy, was intrigued by "this cuckoo proposal," as Negroponte now calls it.

Negroponte knew it would cost big money, and although confident of the technology, felt he was out of his depth in the area of natural language processing. The two eventually developed the idea of a thinktank and experimentation center, and in 1979 it was approved by MIT. Funding was sought, construction began, and the Media Lab was born in 1984, with Negroponte as its founding director, a job he still holds.

The Media Lab brought together top thinkers to solve the problem of human-machine interface. Among them was Marvin Minsky, widely credited as one of the fathers of robotics. "Marvin is the smartest man I know," Negroponte says. "His humor defies description, and he is arguably the most important computer scientist alive."

The Lab's work in artificial intelligence, computers in education, image manipulation, eye-tracking technology and

communications systems has been considered the leading edge for some time. But in those early years, the Media Lab consisted of two small laboratories, six offices and a closet on the MIT campus. Just over a decade later, it is housed in a gleaming white \$50 million building and employs 300 people, working on everything from holographic video and computerized musical instruments to robot design and computer games as learning tools. Its rise to success became a pet project of Wiesner, who ensured its early funding at a time when most other faculties were being squeezed.

This has generated some angst on campus. "He runs a closed shop," complains Edward Roberts, professor of management technology at MIT. "You can't get access to the Media Lab. It is open to paying customers with big bucks."

Negroponte denies this, but agrees that he's not exactly the total academic team player: "I am not part of any MIT committees and refuse to indulge in academic politics. This may make me look like an isolationist."

Negroponte's inability to play ball is compounded by his zeal, which some find more than a little arrogant or obnoxious. "His manner has been misread by a lot of people," says Victor McElheny, director of MIT's Knight Fellowship program. "He has a snippy tone: 'wise up, wake up, you need a kick in the pants.' It doesn't always play well."

Negroponte has had to wear more than a few barbs in the past. The most often repeated being that the Media Lab is all light and smoke, all icing and no cake. "I couldn't have cared less. I knew we were right," he says, adding that the Lab's scholarly publication rate is comparable to other faculties.

The Media Lab has been the home of some innovative advances. It was here that text, audio and visuals merged to become 'multimedia', a now burgeoning field that includes digital film effects, audio editing and interactive CD-ROMs. Now the lab is exploring the future of music, digital education, news delivery, three-dimensional computer work-stations, transparent fonts, and programs that create their own films. Since 1989, 26 patents have been registered by the Lab.

"COMPUTING is not about computers, it's about life," says Negroponte. "We're discussing a fundamental cultural change. Being digital is not about being a geek or an Internet surfer or a mathematically savvy child – it's actually a way of living and is going to impact absolutely everything."

As far as Negroponte's concerned, television as we know it is a dead, antiquated, top-down serial software conduit that is being eaten by the voracious cancer of the digital revolution. Anyone in the industry not preparing for the change will be road-kill within years. Dead is the age of the TV programmers pumping out a serial product that everyone sees in exactly the same way and, importantly, at the same time.

"Today's TV sets let you control brightness, volume and channel. Tomorrow's will allow the viewer to vary sex, violence and political leaning," Negroponte says. "Look at what makes television today: mass audience, synchronized viewing for the convenience of advertisers, and little choice. Compare that to

"Computing is not
about computers,
it's about life"



books. Over 50,000 trade books a year are published in the USA alone. It is a medium of choice. Think of TV like books, delivered over the Internet. That may be the most constructive reply. There will be hits, bestsellers and something for everybody, author and reader alike."

"The shift to user-defined media will happen all over the place," Negroponte claims. "Including newspapers, which until now have done all the deciding as to what is and what is not newsworthy. And advertising will thrive, because it too can be personalized and thus become 'news.' A certain kind of ad, call it the Marlboro ad, will die off and exist only on billboards. The Net will thrive on so-called 'considered purchases' and advertiser-supported delivery, even of e-mail."

Here's a précis of the vision Negroponte has been preaching for the past 15 years. For most of human history, trade has involved exchanging atoms: wheat, iron, cars and computers. Bits of information have until now also been transported in this laborious way: music on CD, movies on film, programs on disk, text and pictures on paper. But the infobahn is changing all that: once an intellectual product can be digitized, it can be shipped across distances at the speed of light.

"Early in the next millennium, your right and left cufflinks or earrings may communicate with each other by low-orbiting satellites and have more computer power than your present PC," Negroponte says in his latest book, *Being Digital*. "Your telephone won't ring indiscriminately; it will receive, sort, and perhaps respond to your incoming calls like a well-trained butler. Schools will change and become museums and playgrounds for children to assemble ideas and socialize with other children all over the world.

"We will socialize in digital neighborhoods in which physical space will be irrelevant.... Twenty years from now, when you look out a window, what you see may be 5,000 miles and six time zones away."

According to Negroponte, the repercussions of this revolution will be massive. Not just in the consumer world, but in the political, social and economic spheres. "My intuition is that this is a big one, much bigger than the Industrial Revolution. But it's like a storm, when you are in it you really cannot compare it so easily with other storms. My guess is that the implications of this revolution – because of its global nature – will force major changes in nationalism, education and economics."

Some social theorists argue that the digital revolution and its breakdown of the mass media as a common experience between people – and therefore an agent of social cohesion – would fragment cultures and nation-states.

"The line of argument that we all get a social prop from the common denominator of popular programs is true, but no more true than a good book, restaurant or movie," Negroponte says.

First of all, headlines don't disappear. An on-demand newspaper does not fail to tell you about poison gas in the Japanese subway, even if you have expressed no interest in Japan, subways or toxic fumes."

We are, however, still at that phase, that calm before the storm, when the old world and the new co-exist. Even Negroponte is tied to this shadow world: although he now hardly ever receives or

"We will socialize in digital neighborhoods in which physical space will be irrelevant"

"Twenty years from now,

when you look out a window, what you see may be

5,000 miles and six time zones away."

sends paper mail or talks on the telephone (he finds it more productive to work on-line), he still has to travel 300,000 miles a year to attend speaking engagements, visit corporations and laboratories, and drum up corporate sponsorship. His 'real' office is housed in a Macintosh PowerBook which he takes around the world. Its physical value, or its value as a bunch of atoms, is around \$2,000. But the bits it carries are worth considerably more: at a pinch, Negroponte estimates they are worth between \$1 and \$2 million.

It is because we are in this transitory stage of the Digital Revolution that Negroponte has abandoned his usual medium to publish 100,000 copies of *Being Digital*. A reworked collection of his *Wired* magazine columns, it is a road map to the infobahn, guiding the reader through the world to come.

AS FOR Negroponte himself, he usually replies to questions about his personal life with the briefest of answers. "What is in the book is already far more than I want to discuss publicly. My wife and I lead a very private life," he says.

Getting to Negroponte the man is like extracting teeth, but the details start to form a picture. He is 51 and has four brothers, one of whom is U.S. ambassador to the Philippines. He and his wife Elaine and their bulldog Clara Bow live in a townhouse in the swank suburb of Beacon Hill in Boston. His family has a home in Switzerland, he owns a house in Greece and rents a holiday cottage in France where he retreats to indulge in his favorite pastime: cooking. His father is 79, and they still ski together in Switzerland. His septuagenarian father is no slouch: he was a member of the 1936 Greek Olympic ski team.

Negroponte revealed to *The Boston Globe* in March, that he grew up in Switzerland, London and New York in a wealthy shipping family. "Lots of travel, private schools (three years in Switzerland) and country homes," he said. "People assume I am independently wealthy. Well, my father gave us all infinite education and nothing after that. When I turned 30, he sent me \$500 as a present, and nothing since."

Aside from a dislike of long e-mail, and a taste for Montrachet, he reveals little else about himself in our last exchange over cyberspace. Indeed there is only the digital Negroponte, whose words glow from the screen. Maybe sent 10 minutes ago. ■



Aumageddon, 58

A PULP MILL MAY HAVE BEEN AN UNLIKELY UNIVERSITY AT WHICH TO STUDY MARSHALL MCLUHAN'S MEDIA THEORIES, BUT ARTHUR KROKER WENT ON TO DISSECT THE GLOBAL VILLAGE. IN HIS LATEST WORK, **DATA TRASH**, HE COUNTS THE ROAD KILL ALONG THE WAY.

data trash

theory

IT IS ALREADY LATE WHEN ARTHUR KROKER EMERGES IN A CATHODE BURST FROM THE COMPUTER'S screen. His name, alphabet data, is pulled from the noise-soup of the Net. Next, some articles he has written and launched into the haze of the datasphere.

It's not that Kroker is hard to find. He's virtually everywhere. A quick scan of the World Wide Web produces a handful of hyperlinked pointers to his whereabouts. Click on one and his collaged image appears. Select another and the schedule of the conference he's attending next week with wife Marilouise pours, by ghosted data light, into your darkened living room. It's 2am but the virtual Kroker is always there, a willing participant in the cyber search. Another click and his e-mail address appears. Contact has been made.

The data trail leads to Montreal, where the embodied Kroker breathes cool Canadian air and works with Marilouise on what seems an endless string of projects.

Through a series of books, an on-line journal (**C-THEORY**) and public appearances, Kroker, a professor of political science at Concordia University, has soldered the circuitry of hybrid hypothesis. He's found himself on the millennium's edge, at a strange confluence where poli-sci meets science fiction, virtuality supersedes reality, bytes replace biology, and communication theory becomes inextricable from sociology. Kroker's most recent work, *Data Trash – the Theory of the Virtual Class* (1994), co-authored with longtime friend and colleague Michael Weinstein, delivers a delirious ride toward a scary future where technotopia is swallowed into the hungry vortex of capitalism, stripping the flesh off our bones on its way.

IT'S EARLY THE NEXT DAY WHEN KROKER'S E-MAIL REPLY COMES IN: "WE'RE DOING A BIT OF multimedia lecture performance in Britain, and, at the moment, we're in the midst of stressing out Montreal's tech capabilities, both in creating some new videos and then finding some fast ways to download Hi-8 into PAL," writes Kroker over the ethernet. "This all has to be done by tomorrow evening, so let's do the interview as soon as we get back in a week."

Kroker is off to the University of Warwick in Coventry, England, where he and Marilouise will deliver the opening address to the Virtual Futures 1995 conference. Later that week he will be taped for a multimedia interview by the BBC, to be aired in the fall.

"Let's set a time for a phone interview," e-mailed Kroker upon his return, "because we may be going to Italy soon." And so it goes with Arthur Kroker, one of the busiest postmodernists this side of the 21st century.



by Nick Marinello  Illustration by Troy Innocent



THE WORD “PHONY” WAS COINED IN SLY HOMAGE TO WHAT WAS AT ONE TIME CONSIDERED THE spurious nature of telephone conversation – a notion charmingly antiquated in the age of virtuality. Over the phone, in fact, Kroker is quite warm, patient, and even funny as he discusses *Data Trash*, a book he considers to be a culmination of his previous writing.

“We’ve been writing on themes related to the body and tech for some time,” says Kroker, who adds that he and Marilouise are “deeply involved” in each other’s work. “My first book, *Technology and the Canadian Mind*, made the argument that understanding technology is Canada’s key contribution to world thought.” The concept of the ‘Canadian mind,’ was explored through the writings of George Grant, Harold Innis and Marshall McLuhan. After that, Kroker expanded his reflections to what he characterizes as “the civilizational crisis of postmodernity” in such books as *The Postmodern Scene*, *The Possessed Individual*, and *Spasm: Virtual Reality, Android Music and Electric Flesh*. Along the way, he and Marilouise have edited three books on feminism and body politics: *Body Invaders*, *The Hysterical Male* and *The Last Sex*.

“All my writings have been a preparation for *Data Trash* – for exploring the implications of our disappearance into digital flesh,” says Kroker. “We are coming to the end of the human species as we know it, and the beginning of the successor to the human race. And that successor is digital reality, which we describe in terms of the interfacing of biology and cybernetics to create artificial forms that will begin to come alive.”

Think of scanning technology, suggests Kroker. Walk into a London department store and your retinas are swept by a security scan that downloads your optic stats into a police databank before you can blink an eye. Slide into an MRI chamber and turn your flesh into binomial notation, a virtual characterization of the living state; slip on data gloves and helmet and *be* virtual.

“Everybody right now inhabits two bodies,” says Kroker. “You have the biological body on one hand and at the same time you have an electronic self.”

Kroker points to Stelarc, the Australian performance artist who blurs the distinction between man and machine by, among other things, wiring his body with cybernetic limbs and sensory equipment.

“He is the Galileo of the electronic body,” says Kroker. “He is determined to creatively think through both the dangers present to the body-as-we-know-it in the new digital environment and at the same time think how the body can be creatively adapted to really radical changes in circumstance. To live in the midst of the violent processes of virtualization is really not the same as living in a consumer culture or living in an industrial or rural society.”

And the transformation is going down fast, propelled by what Kroker calls the “will to virtuality,” a break in Western civilization’s trademark drive toward mastering technology.

“I think [that drive] reached its most intense expression in the development of industrial society and the consumer cultures through the 20th century,” says Kroker, “but with the emergence of digital reality the will to technology has really flipped to its opposite – the will to virtuality, which is radically different. The will to technology is about this fantastic explosion outward, technology as power. The will to virtuality is typified by the fantastic sense of an almost recession of the human species into digital reality. It is about a great symptomatic sense of declining life. It is about powerlessness.”

According to Kroker, this recession into virtuality is also being fostered by a burgeoning new, global social strata, the virtual class. If the data trash are the good guys, the “creative, optimistic, democratic and really intellectually genuine” denizens of the Net, then the virtual class is their natural nemesis.

There are two disparate components to the virtual class, says Kroker. On one hand are the traditional capitalists who are burning rubber on the infobahn to develop their narrow monetary interests as quickly as possible while repeating over and again the mantra, “get into cyberspace or get crushed.” On the other hand are the “really authentic computer visionaries” – the corporate heads of Time-Warner, Disney, Microsoft – who view themselves as masters of digital destiny. “[For them] there is no vision of human existence outside of their own vision of technology as human freedom,” says Kroker. “It is a religious belief and they view themselves as high priests.”

everybody right now inhabits two bodies

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As the struggle for the wired soul of the virtual class plays out, Kroker senses a general panic on the street. He recalls a poignant story recently told to him by a British acquaintance. "She was explaining how computer technology in Britain was very class related. There are real obstacles to people getting Netted, yet at the same time there is this wave of technotopia sweeping England. Technology fetishism of the mediascape has reached the point that her mother called her up in a panic, asking, 'where can I buy an Internet?' She had apparently gone down to Toys R Us and couldn't find one on the shelf."

KROKER WAS BORN IN 1945, IN WINNIPEG, MANITOBA, AMID THE CANADIAN PRAIRIES, BUT WAS raised in Red Rock, Ontario, a small pulp and paper-mill town on the northern shore of Lake Superior. He was 18 when, working one summer's night within the violent hum of a paper mill, he first considered the possibilities of virtuality.

"I had been cleaning the log-skinning machinery called the barking drums," recalls Kroker, "pushing down salt tablets because of the heat, watching logs go whizzing by my head, reading McLuhan's *The Medium is the Message*, and saying to myself, 'What's he mean that the invisible media of technology work us over, silently and irresistibly?'"

Chances are *real* good that Kroker was the only worker in the paper mill that sultry night cracking McLuhan, but it was for him a necessary diversion from the tedium of the barking drums. "If I read McLuhan early it was only as a way of understanding the invisible media that imprinted my experience on a daily basis," says Kroker. "Not just the electronic media, but also the very real medium of a paper-mill town formulated on the hybrid model of feudalism and industrialism."

Kroker would later experiment with McLuhan's theories of culture and technology in his own interdisciplinary crucible, leaving Red Rock to pursue undergraduate and master's degrees in sociology, and a doctorate in political philosophy.

Kroker's original dissertation, in fact, was on ecology, but he was unhappy with it and never presented it. After a period of "really being stumped," he found inspiration, during a 1972 trip to Italy with Marilouise, for the dissertation that would ultimately become the "Theory of the Reconstruction of the Political Mind".

"I had these fabulous, really mystical experiences, and in a six-week period the whole genealogical structure of the dissertation fell into place," says Kroker. Through the process he developed the basis for a general philosophy of history which Kroker describes in the dissertation through an analysis of "the primary paradigms of human experience" – the cosmological, corporate and organic.

"When I wrote the dissertation, it was only in the way of a philosophical autobiography of my life," says Kroker. "Born Catholic to the point of studying for the priesthood before I abandoned both Catholicism and God, I first knew cosmological experience as my authochthonous. Living in Red Rock, in the shadows of Canada's colonial political economy, and later in different parts of Canada, in the shadows of America's colonial culture, I have always known at first-hand the intimations of deprivation that are primal to corporate experience. And the organic experience is my ongoing rebellion against the cosmological and corporate in favor of making politics, culture and society subordinate to the quest for social justice."

LANGUAGE IS NOT DISAPPEARING INTO THE NET. JUST THE OPPOSITE," ACCORDING TO KROKER. "Words are revalorized on the Net in two forms: people are starting to write again. There are vast reams of writing out there, people telling their life stories on the Net. Language is also in the process of mutating into hypertexted forms."

According to Kroker, hypertext opens possibilities for a form of writing in which the text leaves the page and "begins to float into these impossible spaces." As Internet technology develops, it refines the interface between text, image and one's own physical presence. "Finally you have new ways of dreaming," suggests Kroker, "new ways of remembering and new ways of carrying on creative discourses."

get into cyberspace
or get crushed

Data Trash was in itself a virtual project. The entire thing was written over the Net, as Kroker and Weinstein have not seen each other in more than three years.

Weinstein, a professor of political science at Purdue University, has known Kroker since the late '60s. "We realized that we have reached enough of a convergence," says Weinstein, "that we could attempt a project like this and not assign authorship to any section and take joint responsibility for the whole thing."

Weinstein, who credits Kroker with "whipping me out of existentialism" and into postmodernism 11 years ago, characterizes his interests as primarily physiological and philosophical, an effective counterpoint to Kroker's regard for the cultural. "We share common ground in our interests in society and politics," says Weinstein.

"Arthur and I would have an interchange over the Net about what a chapter would be about and then one of us would write the first section and the other would follow up," says Weinstein, who is currently working on a book titled *Culture/Flesh – Exploration of Post-Civilized Modernity*, a look at what happens when you surrender the notion that culture is somehow human.

Weinstein is also on the editorial board of *C-THEORY*, an ongoing project of the Krokers, yet another flirtation with virtuality and a contribution to what Kroker has called "the tradition of the electronic word."

C-THEORY is the virtual descendent of *The Canadian Journal for Political and Social Theory*, which Arthur and Marilouise edited for 15 years. The change from print to electronic media was perhaps a natural response to the evolutionary tug of the millennium's curtain call.

"We thought that as a journal it should be contemporary with what is going on," says Marilouise. "With a printer we could only publish a couple of times a year and it was turning into a book. What is wonderful about *C-THEORY* is that it is immediate. For instance, we had pieces on the German elections and were able to run an update the day after the election."

Along with analysis of day-to-day event-scenes, *C-THEORY*, which is non-profit and "published" out of Concordia University, offers scholarly articles, book reviews, interviews and translations from an international roster of contributors, and hits the Net every Wednesday to its more than 2,500 subscribers (to subscribe email: ctheory@vax2.concordia.ca, or check it out in digest form on the Web at <http://128.2.19.205/ctheory/ctheory.html>).

"We have received a lot of feedback," says Marilouise. "At first you think you are throwing these articles into a black hole, but we've now received hundreds of letters. Initially people would tell us that they missed being able to read the journal in bed, but what they like about it now is the immediacy of the information."

The Krokers offer a hard copy of *C-THEORY* articles, formatted in PageMaker, to academic contributors who need something more tangible than ASCII to bring back to their publication-hungry departments.

we are data trash.
and it's good

U E ARE DATA TRASH. AND IT'S GOOD." THE APHORISM IS FOUND IN THE BACK PAGES OF *DATA TRASH* AND IS perhaps akin in sentiment to Joni Mitchell's "We are star dust, we are golden," only heated to a bubble on the millennial burner.

All systems are go as we fly, flesh straining but still intact, into the last, gasping winds of the century. The Krokers are well into writing a new book, *Hacking the Future: Flesh-Eating Stories for the '90s*, described by Kroker as "road stories that are rubbed against the most powerful advances in cybernetic culture." Look for it in early '96, accompanied by a 70 minute spoken-word CD with original music and embedded sound by Steve Gibson and David Kristian.

And here's a secret about Arthur Kroker, the brave postmodernist: he senses deeply the powerful gravitational pull of the past.

"My father was [at one time] a heavy-machine operator. During this period, his regular work experience included sleeping outside in tents at 50 degrees below zero. During the winter, the tractor train of supplies that he was hauling would begin to collapse through the ice of frozen lakes. He [would jump] off the tractor, but remembering all the while where the tractor could be located for retrieval in the spring thaw."

It's nice that somebody remembered the tractor. ♣

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by Mark Dery



Michael Jackson

THE 21ST CENTURY WILL SEE A REFINEMENT OF PROSTHETICS,
SYNTHETIC STRUCTURES AND COSMETIC SURGERY.
BODY ARTISTS ORLAN AND STELARC MAY BE PREDICTING THE EXTREMES
OF OBSOLETE BODIES AND POSTHUMAN BEINGS.

erutan tsnigga

We live in an age of engineered monsters.

In cyberculture, the human form seems increasingly indeterminate – reducible to replaceable parts, like the Schwarzenegger cyborg in *Terminator 2*, or infinitely manipulable, like the liquid metal android in the same film. More and more, nature, for so long the read-only memory for much of what we are, can be overwritten, for better or for worse. Transsexuals trapped in the wrong bodies opt for “gender reassignment.” Through cosmetic surgery, growing numbers deface and reface themselves in the name of a generic standard of beauty. Cindy Jackson, who has appeared on *The Jenny Jones Show*, had 19 operations to make her resemble a Barbie doll (she doesn’t); another, more celebrated Jackson has reimagined himself as a gene splice of Diana Ross and Peter Pan. Less frivolously,

pacemakers, prosthetic arms, synthetic bones, cochlear implants, artificial hips, and other medical marvels have extended lives and eased disabilities. “Today’s old are already in one technological vanguard,” asserts Thomas Hine in *Facing Tomorrow: What the Future Has Been, the Future Can Be* (1991). “They have been quite willing to accept artificial devices into their bodies to replace parts that are worn out.” Cyborgs, he writes, “are an old staple of science fiction, but nobody ever predicted that Grandma would turn into one.”

Austral



Cindy Jackson



The hands of her surgeons are guided by a computer-graphic template assembled from digitized reproductions of famous paintings.

10, 20 ◀ Orlan



The ultimate masterpiece?: The composite face has Mona Lisa's forehead; the eyes of G  r  me's *Psyche*; the nose of a Diana attributed to the School of Fontainebleau; the mouth of Boucher's *Europa*; and the chin of Botticelli's *Venus*.



ACCORDING TO ALVIN TOFFLER, GRANDMA WILL HAVE COMPANY in the not-too-distant future. In a 1991 *NEXTWORLD* interview, the futurologist predicted that miniaturized computers "will not only be implanted [in our bodies] to compensate for some physical defect, but eventually will be implanted to enhance human capability. The line between human and computer at some point will become completely blurred." Beyond the merely cosmetic or even the radically surgical alteration of the human body lies the final frontier, the posthuman. Soon, asserts John Harris in *Wonderwoman and Superman: The Ethics of Human Biotechnology* (1992), "We... will be able to create new 'transgenic' creatures of unprecedented nature and qualities" through genetic engineering. In *Mind Children: The Future of Robot and Human Intelligence* (1988), the artificial intelligence theorist Hans Moravec imagines the transferral of human consciousness from its organic body into cyberspace via "downloading" – mapping the idiosyncratic neural network of an individual mind onto computer memory. Once downloaded, a siliconsconsciousness will spend eternity pinwheeling past constellations of data or uploaded into an android whose mechanical muscles never tire, whose memory banks are never short-circuited by age.

Even as science and technology are challenging time-honored ideas about what it means to be human, the body is being transformed into a combat zone by skirmishes over abortion rights, AIDS treatment, fetal tissue use, assisted suicide, euthanasia, surrogate mothering, genetic engineering and cloning. "Your body is a battleground," proclaims a poster by the artist Barbara Kruger.

At the same time, we are suffering from a cultural post-traumatic stress syndrome induced by the relocation, in technology, of an ever-greater number of our cognitive and muscular operations. As Marshall McLuhan noted, the technological "amputation" of human functions is a conspicuous feature of the information age. Bit by digital byte, we are becoming alienated from our increasingly irrelevant bodies. "In the present condition we are uncomfortable half-breeds, part biology, part culture, with many of our biological traits out of step with the inventions of our minds," asserts Moravec.

Issues such as these – the politics of the body in end-of-the-century computer culture – surface in the Body Art of Orlan. Nowhere do body politics, the avant-garde's imperative to shock, and the pathologies of a culture drowning in images and obsessed with appearances come together more arrestingly, or disturbingly, than in the French performance artist's operating theater. Since 1990, she has undergone cosmetic surgery seven times, as part of *The Ultimate Masterpiece: The Reincarnation of Saint Orlan*, a 'carnal art' work-in-progress designed to transform her face into a collage of famous features. The hands of her surgeons are guided by a computer-graphic template assembled from digitized reproductions of famous paintings.

The composite face has Mona Lisa's forehead; the eyes of G  r  me's *Psyche*; the nose of a Diana attributed to the School of Fontainebleau; the mouth of Boucher's *Europa*; and the chin of Botticelli's *Venus*. Each operation is a performance: The patient, surgeon and attending personnel wear *haute couture* scrubs, designed in one instance by Paco Rabanne, and the operating room is decorated with crucifixes, plastic fruit, and outsized placards displaying the production's 'credits' in the kitschy style of '50s movie posters. Given only local anesthesia, Orlan acts less like a patient than a director on the set: during a 1993 operation in New York, she read from a book on psychoanalysis and interacted by phone or fax with viewers around the globe watching a live video transmission of the event via satellite. "I will stop my work when it is as close as possible to the computer composite," she informed *The New York Times*' Margalit Fox, in a 1993 interview. Her self-objectification is instructive: By "it," she means her body, which is synonymous in her case with 'my work.'

Whether Orlan's surgical performances are carnal art or carnival art is a matter of heated debate. The critic and curator Barbara Rose contends that the artist is acting out "the madness of a demand for an unachievable physical perfection"; the conservative art critic James Gardner maintains in his book *Culture or Trash?* that she is merely a particularly noxious example of "the French obsession with refinement and feminine beauty." Orlan insists that she is a feminist; her art, she told me in a written interview, "brings into question the standards of beauty imposed by our society... by using the process of plastic surgery to a different end than the usual patient does" – although how the rearrangement of her face in the image of an idealized femininity constitutes such a critique is unclear. Her characterization of the experience of going under the knife as "cathartic" would not sound out of place on the lips of a plastic surgery addict. Then, too, there is the sticky business of her self-promotion: like any seasoned celebrity, she repeats sure-fire soundbites ("I have given my body for art"; "The body is but a costume") and wraps gore, glamour, and the ever-popular image of the eccentric artist in a mediagenic package. "I feel I'm the artist who has gone the furthest," she writes in a press release.

Like all great media manipulators, she blurs the line, *a la* Salvador Dal   and the postmodern kitsch-monger Jeff Koons, between art and advertising, product and public image (*The New York Times* called her private life "a carefully constructed cipher"). She sometimes appears in photographs dressed as the baroque "Saint Orlan," a sobriquet reminiscent of the Surrealist's preferred title, "The Divine Dal  ," and she out-Dal  s Dal   by becoming her own commodity in the most literal sense: The fat removed during her operations is on sale in petri dishes dubbed "reliquaries." In our written interview, Orlan sums up her philosophy in fractured English. "Orlan wants to fight against... the 'inexorable,' against the inborn, against DNA," she writes. "Religion and psychoanalysis... say... that one doesn't have to fight his body (go against what is natural); [this] is the primitive idea that we must accept ourselves [as we are]. It is taboo to touch the body, to open the body and show the inside... But [in an age] of genetic manipulation, this is a primitive outlook."

In the final analysis, it is “primitive,” humanist notions of what is natural and what is unnatural that are Orlan’s true *bête noire*. Not the sexist “standards of beauty imposed by our society.” Just beneath her politically expedient rhetoric about the evils of media beauty myths, Orlan – who refers to herself as a “replicant” and who declares, “I think the body is obsolete” – conceals a not-so-secret dream: to be the art world’s first cyborg celebrity.

Stelarc, too, believes that “the body is obsolete.” The foremost – perhaps the only – exponent of cybernetic Body Art, he has evolved an aesthetic of prosthetics, outlined in his 1984 essay “Strategies and Trajectories,” in which “the artist [is] an evolutionary guide, extrapolating new trajectories... a genetic sculptor, restructuring and hypersensitizing the human body... an evolutionary alchemist triggering mutations, transforming the human landscape.” He embraces McLuhan’s belief, stated in a 1969 *Playboy* interview, that “new technology breeds new man.” Following McLuhan, Stelarc believes that the dizzy whirl of the information age has outpaced and overtaxed the human nervous system. In his essay “Prosthetics, Robotics and Remote Existence: Postevolutionary Strategies” (1991), the artist argues that humanity is unadapted to the infosphere. “It is time to question whether a bipedal, breathing body with binocular vision and a 1,400cc brain is an adequate biological form,” he writes. “It cannot cope with the quantity, complexity and quality of information it has accumulated.... The most significant planetary pressure is no longer the gravitational pull, but rather the information thrust. Gravity has molded the evolved body in shape and structure and contained it on the planet. Information propels the body beyond itself and its biosphere. Information fashions the form and function of the postevolutionary body.”

Stelarc’s cybernetic events are dress rehearsals for posthuman evolution. Nearly naked but heavily laden with hardware, the artist in performance bears a striking resemblance to Borg, one of the nefarious man-machines encrusted with implants and bristling with cables in *Star Trek: The Next Generation*. In a typical performance, Stelarc stands, plastered with electrodes and entangled in wires. Sometimes, he dances with hulking, industrial robot arms, dodging their potentially bone-shattering swipes. On occasion, pulses from Argon lasers emanate from a cage-like structure perched on the artist’s shoulders. The beams are made – through eyeblinks, facial twitches, and head movements – to scribble luminous doodles in the air. A storm of sounds, most of them originating in Stelarc’s body, whooshes around the performance space. That muffled, metronomic thump is the artist’s heartbeat, amplified by means of an ECG (electrocardiograph) monitor. The opening and closing of heart valves, the slap and slosh of blood, are captured by Doppler ultrasonic sound transducers. A kinetic-angle transducer converts the bending of his right knee into avalanches of sound; a microphone, placed over the larynx, picks up throat noises; and another transmitter tethered to facilitate painless removal, renders stomach activity audible when swallowed.

Connected to an acrylic sleeve slipped over the artist’s right arm, the Third Hand whirrs into life. The Hand is a dextrous robotic manipulator which can be actuated by EMG (electromyo-

gram) signals from the muscles in the artist’s abdomen and thighs. It can pinch, grasp and release as well as rotate its wrist 290 degrees in either direction. In addition, it possesses a tactile feedback system which provides a rudimentary sense of touch through the stimulation of electrodes affixed to the artist’s arm.

Recently, Stelarc has reached into cyberspace with a Virtual Arm. Developed in the Advanced Computer Graphics Center at the Royal Melbourne Institute of Technology, the Arm is a computer-generated “universal manipulator” – a digital cartoon of a humanoid limb – controlled by gestures from a CyberGlove. The Arm can rotate its wrist and fingers continuously; stretch from here to eternity; sprout extra hands or clone an octopus-like tangle of arms; shoot spheres or draw lines with its fingertips. In *Actuate/Rotate: Event for Virtual Body* (1993), Stelarc took the next step up the techno-evolutionary ladder. Donning a Polhemus magnetic tracking system whose sensors were attached to his head, torso and extremities, he interacted with a Virtual Body that mirrored his every move. The digital *doppelgänger* appeared, alternately, as a wire-frame skeleton or a fleshed-out mannequin on a video display monitor. Simultaneously, video cameras fed live images of Stelarc’s physical body into the system, and the computer-generated point of view – the virtual camera – was choreographed by his gestures, generating montages of fleshy and ghostly bodies.

“All the signposts direct us to him,” declares the cyberpunk novelist John Shirley, in “Stelarc and the New Reality,” a 1987 *Science Fiction Eye* essay that theorizes Stelarc as the embodiment of cyberpunk’s posthuman yearnings, a “synthesis of erstwhile humanity and tomorrow’s humanity struggling to be born.” Shirley draws parallels between Stelarc’s preoccupation with technologically-enabled evolution and similar themes in cyberpunk novels such as Bruce Sterling’s *Schismatrix* (1985), in which genetic engineers and prosthetic technicians struggle over the future of the human form. Like Toffler, Stelarc sees the potential for self-directed evolution in hi-tech prostheses and other medical technologies. “Patched-up people,” he claims, “are evolutionary experiments.”

According to Stelarc, miniaturized, biocompatible technologies will one day make each individual a species unto himself: “Once technology provides each person with the potential to progress individually in [his or her] development, the cohesiveness of the species is no longer important” he states in “Prosthetics, Robotics and Remote Existence: Postevolutionary Strategies.”



Stelarc ► 10, 20



Dali’s Angels: Stelarc and Orlan out-Dali Dali. She blends postmodern diva, baroque sculpture and plastic surgery disaster; he synthesizes McLuhan, artificial intelligence theory, and science fiction dreams of transcending the body and escaping gravity.

Yet they both share
the revealing habit of objectifying the body.



"It is no longer meaningful to see the body as a site for the psyche or the social but rather as a structure to be monitored and modified."

STELARC

IN MANY WAYS, ORLAN AND STELARC ARE UTTERLY UNLIKE. SHE blends postmodern diva, baroque sculpture and plastic surgery disaster; he synthesizes McLuhan, artificial intelligence theory, and science fiction dreams of transcending the body and escaping gravity. Yet they both share the revealing habit of objectifying the body: Orlan's body is "it," her work; Stelarc's is always "the body," never "my body."

But none of us is truly posthuman; for now, at least, each of us inhabits a body, not an "it," and the issues that affect us most profoundly are those that converge on our bodies: Who owns my womb? Who polices my sexual preference or practices? Who determines the lawfulness or unlawfulness of my decision to end my own life? Who controls my access to drugs, whether they are life-saving or merely recreational? Who regulates what birth control methods I can legally or morally use? Who determines what body contours are "desirable," what ethnic features "acceptable?" Who makes the laws or enforces the mores that restrict my ability to tattoo, pierce, scar or brand my own flesh?

The cyborg fantasies of Orlan and Stelarc float in a social and political vacuum, cut loose from everyday lives and individual bodies. In her essay "Baudrillard's Obscenity," the cultural critic Vivian Sobchack worries that if we don't keep a "subjective kind of bodily sense in mind as we negotiate our technoculture, then we... will objectify ourselves to death." Historically, objectification has often been a prerequisite to repression or worse. Throughout the 20th century, the reduction of women to "sex objects" has proven an all too effective means of subjugation. As early as the 1920s, Stuart Ewen notes in *Captains of Consciousness: Advertising and the Social Roots of the Consumer Culture* (1976), advertising educated American women "to look at themselves as things to be created competitively against other women: painted and sculpted with the aids of the modern market."

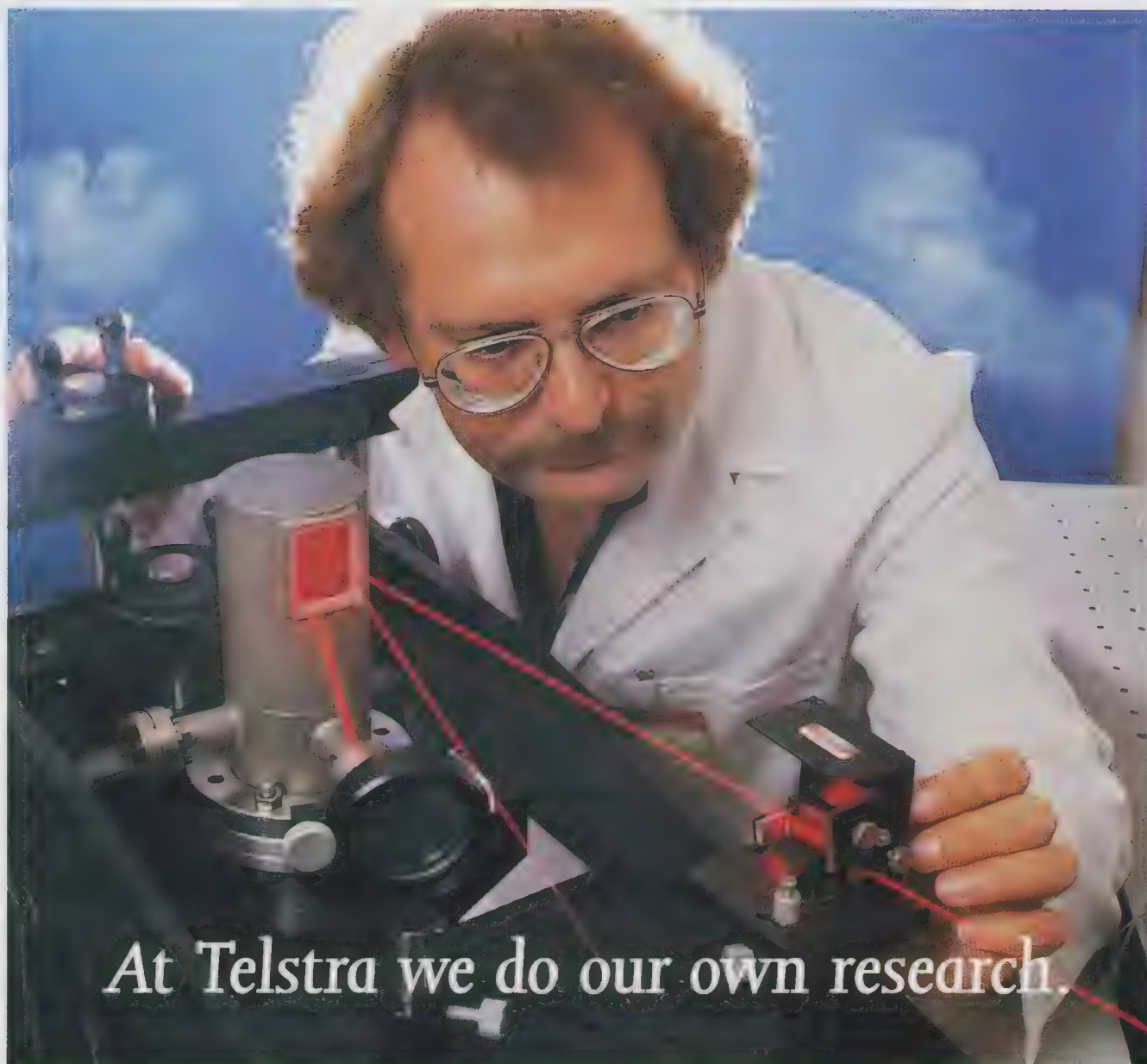
Objectification played a significant role in the Nazi annihilation of European Jewry as well. A concentration camp survivor

quoted in *The History of the Holocaust as Told in the United States Holocaust Memorial Museum* (1993) recalls: "And as they gave me my tattoo number, B-4990, the SS man came to me, and he says to me, 'Do you know what this number's all about?' I said, 'No, sir.' 'Okay, let me tell you now. You are being dehumanized.'"

History forces us to wonder whether or not Orlan and Stelarc's posthuman rhetoric of objectified bodies can be disentangled from troubling memories of the objectification of female, Jewish, non-white and gay bodies throughout this century. Then again, isn't the work of these two postmodern body artists about leaving human history on the launching pad? In a recent interview, Stelarc told me that through "cyber-systems we have the potential to escape the tyranny of human history, the tyranny of cultural containment, the tyranny of our present biological structure.... Evolutionary structures or political institutions or even social rituals have evolved and continue to exist because they're successful at resisting change. Now, if we're to make this radical redesign of the body, we have to proclaim the obsolescence of the body on one hand and on the other we somehow have to shed the evolutionary and social and religious baggage which we carry, which contains and constrains us."

Which raises another question: If we leave the human form and earthly history behind, fusing in cyborgian symbiosis with our machines, what will anchor our ethics? What meaning would the word "humane" have for a being that had ceased to be recognizably human? Posthumans would have little use for human morals, which is why Orlan's professed feminism and her obvious posthumanism cancel each other out: those who declare war on "what is natural" are in no position to bemoan the unnatural "standards of beauty imposed by our society"; if the body is simply so much RAM, waiting to be overwritten, one cut is as good as another. Furthermore, won't posthumanity's Icarian quest for total freedom from "the tyranny of human history, the tyranny of cultural containment, the tyranny of our present biological structure" carry us beyond the body altogether, into Hans Moravec's realm of downloaded minds? At the same time, if we relegate the body to the evolutionary scrapheap, along with history, culture and everything else that confines yet also defines us, what center of gravity will prevent that last remnant of humanity, the self, from flying apart?

In a recent interview, Terence McKenna, a philosopher of cyberculture, had some intriguing thoughts on this matter—a sort of bedtime story for the end of the millennium. "What we have to be leery of with all these technological fantasies is an incomplete psychology," he told me. "There are a lot of unanswered questions about human consciousness and consciousness generally, and I suspect that what hasn't been realized is that the body image is a kind of governor on the imagination. If you could actually download consciousness into a computer, it would probably evolve itself into unrecognizability within minutes because the human body and the constraints of 3-dimensional space and time are what hold us in the human mode. The truth may be that consciousness arises out of the mess of matter, and that you cannot extract it from the mess of matter or you won't have the thing you were looking for." ■



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ADVANCING AUSTRALIA

NAT M 000 M

AS AN INCREASING NUMBER OF PEOPLE FEEL EXCLUDED FROM THE POLITICAL PROCESS, EXPERIMENTS ARE TAKING PLACE IN AMSTERDAM WHERE THE CITY'S DECISION-MAKING IS EXECUTED ON-LINE. IF YOU'RE OLD ENOUGH TO USE A COMPUTER, YOU'RE OLD ENOUGH TO VOTE. THE CITY'S FIRST 'DIGITAL MAYOR,' MARLEEN STIKKER, EXPLAINS ITS FUTURE.

o n - l i n e

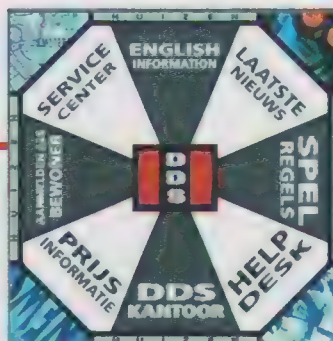
by Shuschen Tan Graphics from DDS WWW site

I digital city does not consist of bricks, concrete and cobblestones, but of telephone lines and electronic connections. Can such a city work? Last year, Amsterdam's Balie cultural center started such an experiment, together with the 'xs4all' [ex-'hacktic'] foundation. Anyone who's got a phone, a modem and a computer can log into the digital-city host computer and walk around town like a digital spirit: she can visit the central station, the digital cafe and the electronic town hall. Marleen Stikker is the 'mayor' of Amsterdam's Digital City (DDS), project manager at the Balie and initiator of DDS. She looks back at one year of promises, fulfilled and unfulfilled.

"Well, of course, sometimes the level of discussion in a particular newsgroup is no higher than on chatterboxes; and you do have the occasional rabid Rightist spreading racist smut on the Net. But generally speaking, life in the DDS is pretty OK. It's just like an ordinary city," says Stikker. "Everything you'd come across in ordinary life, we get here too."

A little over a year ago, the DDS opened its doors. Council elections were just coming up, and the new electronic medium looked just like the thing to bridge the gap between citizens and the authorities. The Amsterdam Municipality decided to subsidize the experiment, together with the (national) ministry of economic affairs and that of the interior. For the first time, DDS enabled Amsterdam's citizens to look on-line into the council's minutes, to consult official policy papers, and to request information from the digital town hall. But there were other activities, too. The 'Central Station' offered access to the entire Net; one could patronize a digital cafe, browse through a digital kiosk, enter the digital house of culture and the arts, or pay a visit to a digital sex-shop, complete with a digital darkroom in the back.

"All those ideas you had heard so often from the U.S. about the new information society, tele-democracy, electronic citizenship, suddenly became a reality on DDS," says Stikker. She envisaged the set-up known in the U.S. as Freenet, a kind of virtual city where homeless people managed to demand via computer, and obtain in reality from the town's authorities, public showers and



dressing-rooms so they could wash and dress appropriately when going to a job interview

Stikker, however, had never really envisaged that the interest in the Amsterdam experiment would take such a course. Within a week of the DDS inauguration, no modem could be obtained in Amsterdam for love or money. The original 20 phone lines

providing access to the DDS computer were overloaded at any hour of the day or night. But the rush has since stabilized; the daily number of users now hovers around 4,000. One million 'pages' are being requested a month. A new configuration has been installed, the original primitive menus have been replaced with a lot of graphics (photos, maps), and DDS looks poised to evolve into a truly virtual community

In the beginning we were really afraid that the response would come only from that small band of 'computer-hackers' and BBS types you always encounter in this sort of project," says Stikker, who adds, "what you call the 'early adapters,' very young kids mostly, who have grown up without a push button syndrome." Fortunately, it soon turned out that was not the case. 'Ordinary' people, too, purchased a modem and went on-line. Yet Stikker is still far from satisfied about the rate of participation in DDS. "The digital population has a long way to go before being a true representation of the public at large," she says. There are still too few women, senior citizens and minority groups. A newsgroup that was set up especially for women was invaded in no time by men. "You wouldn't believe it," Stikker recalls, "all these guys were sitting there discussing women's issues. Till one of them said: 'look folks, if I was a woman, I wouldn't dig that!'"

Women are, anyway, something of a rarity in the virtual community. "That's not surprising when you see how few women are sitting in front of a computer screen. The rot is in the education system," Stikker says. "You just go and have a look in the terminal rooms at Holland's largest technical university, Eindhoven: out of 400 users, you'll see two or three females. It is only recently that news items about the Net and the digital highway have made inroads into the columns of magazines like *Opzij* [a Dutch feminist monthly] and *Elle*."



CBD home page: Amsterdam's central business district allows locals to vote, discuss public issues and tour sponsored sites and neighbors' home pages.

Stikker did not feel like interfering when the women's newsgroup became a male territory. "That's not our job," she says. "We provide the platform and the tools. It's up to the people in the newsgroups to decide what they want, we do not interfere." Not even when things are uttered that in ordinary life would put you in court? "Well, sometimes you see things get out of hand, like with the Rightist who went on for weeks, ranting about foreigners. In real life, this would have resulted in fistfights for sure. But that's not possible in a digital city. So here such a discussion will be spun out in all of its details, replete with references and argumentation." It is a totally different form of communication, says Stikker. "We are not moralists. We want the DDS population to evolve a code of behavior for such cases, just like it happens on the Internet. We cannot prevent some people from entering DDS. And for the rest, we simply abide by the Dutch legislation. We will not tolerate neo-fascist clubs or child pornography."

Stikker admits that the newsgroups, in which everyone can participate, are sometimes turning into a free-for-all platform. "Precisely because [DDS] is such a direct and anonymous way of communicating, emotions can get into a high pitch. And that is not always to everybody's liking." DDS is now in the process of developing different types of newsgroups. "We have come to realize that some groups work best under a situation of full freedom, while others are better off with the help of some kind of moderator. This is basically a question of conventions: a boardroom meeting carries a different type of conversation than the one you would have in a pub. At DDS, we would like to emphasize this kind of difference in style, so as to enable the digital citizens to choose between, say, the Hard Rock Cafe and [something more conservative like] Tortoni."

And then, what about the much vaunted digital empowerment of the citizens? That was, after all, the *raison d'être* of the whole project. Local political issues – a car-free Amsterdam; Schiphol Airport's extensive expansion plans; ROA, the new regional government set-up [in which Amsterdam would disappear as a municipal body]; law and order issues – are all thoroughly discussed in the various newsgroups, but mostly by the citizens themselves. "The politicians have not been overwhelmingly on-line," admits Stikker. "It's not lack of goodwill, but they're a bit shy about the medium." That also, according to Stikker, is due to the style of discussion prevailing in the newsgroups. "Newsgroups are perceived by politicians as too anonymous, and therefore too threatening."

Other discussion formats are more successful: "In our 'Question Time' – where politicians react to items put forward by citizens – they do come forward." The Social Democrat city secretary, Guusje Terhorst, for instance, participated in a debate about the future of a 'regional urban province,' while the eco-socialist Cees Hulsman discussed with digital citizens issues pertaining to the local job situation. On the other hand, *ad interim* mayor Frank de Grave, who inaugurated the DDS with much fanfare one year ago, has not been very active since, to say nothing of Amsterdam's new mayor, Schelto Patijn. To affirm that DDS is going to close the gap between citizens and politicians is somewhat of an exaggerated claim, according to Stikker: "It's quite clear that making information and databases available to the public is only the first step in this process of democratization. Real empowerment of citizens through the Net – one may, for instance, think of electronic referendums – presupposes a level of administrative openness still very much remote from our present institutions."

A fine example of the tricks being played on the citizens is the issue of selling off KTA, Amsterdam's municipality-owned cable-TV system. [KTA is profitable and yet cheap and convenient – it's in your utility bill – and even democratically organized – to some extent. It also runs two public-access channels, beside 22 general/commercial ones.] The municipality is totally mute about the whole issue, even within DDS. "Up to now, it's been a black box," says Stikker. "The council authorities are not showing any inclination to talk about it." The problem is that KTA plays a crucial role in any further development of a local interactive network – since the system's co-axial cables offer much more bandwidth than the existing telephone infrastructure. It's therefore likely that KTA, and not the telephone company, is going to be the digital carrier of the future at the local level.

"Presently, we are simply hooked up to the telephone system," says Stikker. "But in future, it's our hope that room will be set aside on the cable system for an interactive network with public interest functions like ours, and not that it will be up to the highest bidder to decide who may come in and under what

conditions." The estimated value of KTA's sell-off is around 400 million Guilders (US\$225 million). According to Stikker, some of that money should already be earmarked for the establishment of such a public domain. "They are talking about that at the town hall, but I've got a feeling that awareness about the issue is of fairly recent date. And any concrete question you may put forward about it is considered premature."

Stikker is nevertheless hopeful about the future. The idea of a digital city is catching on. Rotterdam is also setting up an interactive local-area network. Utrecht Province is opening its digital doorways this month, with Groningen. The Hague and Eindhoven following suit shortly. The ministry of economic affairs has requested that DDS put together a handbook based on the experience gathered over these past two years.

"We have now moved from the stage of being an experiment, into that of being a phenomenon," says Stikker. "Now we are busy consolidating what we

have achieved so far, that is, to explore how you can sustain such a system without becoming rigid. We want to keep DDS open and dynamic. At this stage there is fairly stiff pressure to go the commercial way. We will do that to some extent, by allowing some room for advertisements." Which means that small and medium-sized Amsterdam enterprises will be putting ads on the local Net in the near future, though nobody knows how those 'interactive advertisements' should look.

Stikker does not doubt for one moment that DDS is catering to a real and current need. "As soon as it becomes clear that DDS is not merely a playground for computer freaks, you'll see all sorts of groups moving in." Stikker alludes to a multitude of on-line services, such as help-lines for older and disabled people, doctors' services and databanks for legal assistance. "Our primary concern at the moment is to develop a kind of 'data-literacy' among people who up to now were living quite outside it. I think each and every association should have one person who knows how to link up with DDS." Individual citizens also may come into the DDS and fashion it their own way: "Anyone can build up her own digital dwelling in DDS's 'boroughs.' And you can start up all kinds of activities from your own house: broadcasting your home videos, organizing jam sessions, opening your own private museum, etc."



Channel surfing: Click on infotainment or discuss the cable TV sell-off in other chat-rooms.

When hearing the term 'new media' many people still get the 'nukes-jitter'. They perceive it as a threat. Stikker says: "I don't think this is a very sensible attitude, since we are inventing these technical tools ourselves. When I had my first experience with the Internet two years ago, I immediately realized that this was not merely about computers, but that there were a lot of implications associated with these techniques. Everyone now has the opportunity to evolve from a passive consumer of information into an active provider. Suddenly, social and political processes take place within a very much altered field of reference. In this respect, technology is truly a cultural phenomenon."

According to Stikker, the central issue with DDS is the fulfilment of human needs. "Everybody is equal on the Net. People who never left their houses because they were afraid of crowds now regularly gather on bulletin-boards. You encounter people on the Net you would never meet in real life. That need to communicate is very human. What people love most is endless chit-chat with each other. And, of course, that is precisely what DDS is best suited for." ■ Translated by Patrice Riemens

You can visit the Digital City in Amsterdam using the World Wide Web, at the following URL:
<http://www.dds.nl> or email to helpdesk@dds.nl.
 You can reach Marleen Stikker at <stikker@xs4all.nl>.



Various icons may come into the DDS
 and become part of the city. Anyone can build up her own
 small kingdom in DDS's 'boroughs'.

"it's quite clear that making information and databases available to the public is only the first step in this process of democratization.

real empowerment of citizens through the net - one may, for instance, think of electronic referendums - presupposes a level of administrative openness still very much remote from our present institutions."





by Julian Brown

Illustration by Noel Richards

WHILE EVERYONE TALKS ABOUT THE INFORMATION REVOLUTION, TECHNICIANS ARE DISCOVERING WAYS TO BOOST THE SPEED ON THE INFOBAHN DRAMATICALLY, USING SAND AND LIGHT. THE RESULT WILL SEND NEW WAVES ALONG THE INFORMATION FAST LANE.

A single strand of optical fiber is thinner than a human hair, and yet it has the capacity to carry the entire world's telephone traffic. That, at least, is the claim of Peter Cochrane, director of research at BT, Britain's main telecommunications company, and a man who speaks with missionary zeal about the future of the wired society. In his view, anyone who thinks that the way ahead for telecoms is to charge people through the nose for making long distance telephone calls is "brain damaged."

"In the future, voice communication across the world is going to be so cheap it'll hardly be worth charging for," he says.

At first hearing, one is reminded of what the experts said about nuclear power in the 1950s. "It'll be so cheap, it won't be worth metering." We all know how wrong that prediction was. Yet perhaps there is reason to share Cochrane's optimism. The burgeoning use of the Internet is already proving that it is possible to send data across the planet at virtually zero marginal cost. The problem is that the amount of data is so limited.

At the moment, downloading anything substantial such as pictures, sounds or video from the Internet can take forever. The problem is that for all the talk about high-speed digital communications, there's so much traffic it just can't get through fast enough. What is needed is a substantial increase in the data capacities of the links on the Internet and of the wires into people's homes – at affordable prices. Greater bandwidth would not only allow much faster Net surfing but would also open the way to videophone telephony and multichannel interactive television. Only then will the information superhighway begin to mean what its name suggests.



ICS



The obvious answer is to connect everyone by fiber-optic cable. These tiny strands of glass already carry all kinds of voice, video and computer data across the planet and would easily remove the bottlenecks into our homes and offices. This would, of course, put a strain on the existing fiber-optic services that form the backbone of present telecom services. But Cochrane's point is that fiber-optic cable has the potential to carry a great deal more traffic than it does today

Consider the numbers. At the moment, the fastest fiber circuits carry up to 2.5 billion bits (or 2.5 giga bits) per second, which is enough to carry 40,000 telephone conversations or 250 television channels. But in fact, optical fibers could carry far more than this. In principle they have the capacity to carry up to 50,000 giga bits per second. Absorb the fact that the world's telephone traffic is currently equivalent to a mere 100 giga bits per second and you begin to see what Cochrane is driving at

But if these amazing strands of processed sand are so powerful, why are the telecom companies only using a tiny fraction of their potential? The reasons, as so often happens in the real world, come down to grubby technical details.

Fiber-optic cable works by carrying light pulses along its length, covering large distances with very little loss. The light bounces back and forth inside the glass by a process known as total internal reflection, a phenomenon taught to, and usually forgotten by, most high school kids obliged to experiment with the refractive properties of glass. These reflections occur with great efficiency, but are not absolutely perfect. Some loss is inevitable. Optical fibers, like ordinary glass, can carry light of any wavelength within the visible spectrum and beyond but, because these losses tend to get bigger for more extreme wavelengths, the telecom companies like to use ones that travel with least impediment

Keeping losses down is particularly important on long distance connections such as sub-marine cables across the Pacific or Atlantic, because of the need to amplify the signals. The longer the distances, the more frequently amplifiers are needed along the circuit. These amplifiers have to be built for ultra-high reliability and are extremely expensive. Sub-marine cable amplifiers, for example, cost around US\$30,000 a piece, and on a transoceanic connection there may be hundreds of them.

So the need for amplification places a major constraint on the choice of wavelengths that can be used over a fiber-optic cable. But fiber-optic cable also

IF THESE AMAZING STRANDS OF PROCESSED SAND
ARE SO POWERFUL, WHY ARE THE TELECOM COMPANIES ONLY
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suffers from another problem, known as "dispersion." This refers to the way that different frequencies or wavelengths travel at slightly different speeds in glass. It is dispersion that causes a prism to split white light into a spectrum of colors. The reason it is a problem in fiber optics is because it causes pulses to spread out as the faster moving wavelengths move ahead of the slower ones. If the process was left unchecked, data pulses would begin to overlap with one another causing unacceptable data errors.

The problem of dispersion becomes more critical if you try to send pulses more quickly, because there is less time between them and more chance of overlap. Like the problem of loss, it turns out that the amount of dispersion varies according to the wavelength of light used. Minimal dispersion occurs at a slightly different wavelength from minimal loss.

In the late 1970s, after much consideration, the telecom companies agreed to use as standard the wavelength that minimizes dispersion at the expense of a small amount of loss. So they chose to use only a tiny window in the entire spectrum of wavelengths that could travel down a fiber-optic cable. That window is centered on the wavelength of 1.3 micrometers.

Nevertheless, even that little window is capable of letting a lot more data in and out than is currently allowed. Until recently, the main factor limiting the rate at which data is squeezed through the window has been the slow speed of the optoelectronic amplifiers used for boosting and switching the signals. But in the last few years there has been a revolution in the fiber-optic industry because of the development of purely optical methods of amplification and switching. In the 1980s it was found that if a fiber-optic cable is doped with the rare earth element erbium, it displays unusual properties. When these doped fibers are pumped with additional laser light they can be made to amplify optical pulses.

The beauty of these optical amplifiers is that, compared with electronic amplifiers, they are extremely fast and they work over a broader range of frequencies. They also have the advantage of being simpler and therefore more reliable, making them ideal for transoceanic connections where reliability is at a premium. However, they do have one drawback: using optical amplifiers over long distances at high data speeds greatly exacerbates the problem of dispersion

It turns out that these erbium-based optical amplifiers won't work at the magic wavelength of 1.3 micrometers. Instead they need signals at around 1.5 micrometers where fiber dispersion is much higher. To overcome this, it is possible to make "dispersion-shifted fiber" which is low in dispersion at 1.5 microns instead of 1.3.

Given that, telecom companies intend to use dispersion-shifted fiber on the next generation of trans-Atlantic and trans-Pacific cables. However, this approach is not much use for the many millions of miles of fiber-optic cable that have already been installed

Furthermore, no matter what wavelengths are chosen, dispersion cannot be eliminated entirely. Any modulation of the light beam in the form of pulses generates additional frequency components either side of the central carrier frequency or wavelength. Even if the carrier frequency is dispersion free, these components will still suffer from some dispersion

This problem is not so great when using electronic amplifiers because each time the pulses are amplified they are regenerated anew: thus 'tired' pulses arriving at the end of a length of fiber-optic cable are relayed as sharp new pulses on the next leg of their journey. Amplifiers are spaced every 31 miles on transoceanic and trunk routes, so the problem of dispersion is limited to just 31-mile lengths of fiber cable. Optical amplifiers, on the other hand, do not regenerate pulses but simply boost their strength. The stretching effects of dispersion can accumulate over the full length of the fiber, which may be thousands of miles



THE QUESTION IS, IF TELECOM COMPANIES WANT TO INCREASE THE DATA capacity of their fiber connections, how are they going to overcome the problem of dispersion? It is here that the journey to the superhighway of the future can take a number of different routes.

One of the most intriguing options is to follow a path first trodden as long ago as 1834. One summer's day, John Scott Russell, a Scottish civil engineer, was quietly observing the motion of a boat in the canal between Edinburgh and Glasgow. The boat was being drawn along at speed by a pair of horses when suddenly it stopped. Russell noticed that the water around the boat continued to surge along the canal in the form of a single wave. To his surprise, the wave appeared to travel along the canal with hardly any loss of speed or height. Russell decided to follow the wave on horseback and rode over a mile before the wave finally petered out.

What Russell observed, making him the first person on record to have witnessed the phenomenon, was a soliton: a single solitary wave that has the unusual property of being able to travel without spreading out. These unusual waves triggered considerable scientific interest. In the 1870s the French physicist Joseph Boussinesq and the English physicist Lord Rayleigh independently deduced the wave's secret: the pulse's longevity depends upon an intriguing mathematical cancellation between two different effects: dispersion and non-linearity.

Non-linearity is yet another defect of glass. In this case it refers to the way the amplitude or brightness of light pulses can affect the speed with which the pulse travels. Non-linearity doesn't usually arise in normal optical fiber transmission because the brightness of the pulses is kept rather low. Turn up the brightness and non-linearity steps in; in much the same way as turning up the volume too high on a radio produces distortion.

The amazing thing about the non-linearity in glass and water, though, is that for these special soliton pulses it can effectively cancel out the distorting effects of dispersion, allowing them to travel almost unperturbed.

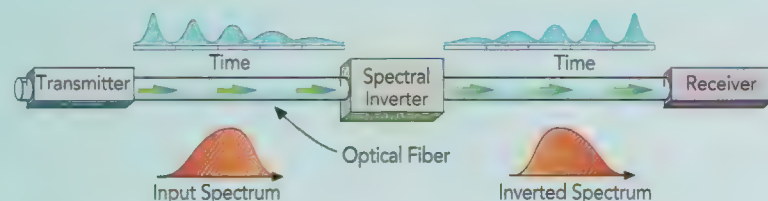
Although solitons have been known for over a century, it was not realized until the 1970s that a similar phenomenon might occur in fiber optics. Sure enough, in 1980, Linn Mollenauer at AT&T's Bell Labs in New Jersey demonstrated soliton transmission through a fiber-optic cable for the first time. In 1988, he and his colleague, Kevin Smith, set a world first by sending soliton pulses of light along an optical fiber path of more than 3,700 miles without any form of electronic regeneration.

Today Smith, who now works at BT's research labs in Martlesham Heath, says it is possible to transmit solitons over virtually infinite lengths of fiber-optic cable without the need for electronic regeneration. Furthermore, the soliton pulses can be made very short – around two or three picoseconds (10^{-12} seconds). With such pulses it is possible to achieve data transmission rates of up to 100 giga bits per second, some 40 times faster than present day systems. With working soliton systems in the laboratory, Smith is confident they will be in commercial use within the next five to 10 years. This is dependent, however, on the replacement of the existing cable with the new dispersion-shifted fiber-optic cable.

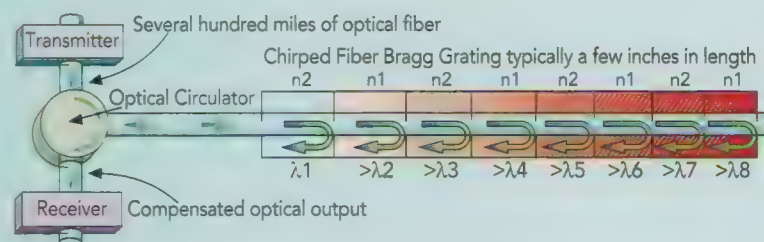
Meanwhile though, other researchers – at BT and AT&T in America, NTT and KDD in Japan, Alcatel in France and many other telecom labs – are exploring alternative routes to achieving ultra-high transmission capacity over the millions of miles of cable already installed throughout the world.

Another method of overcoming the problem of dispersion is to use a technique known as spectral inversion. Here the idea is to allow pulses to pass along a section of a fiber-optic link and then reverse their frequency spectrum. What happens is that the faster moving frequencies suddenly get turned into slower moving frequencies and vice versa. The spectrally inverted pulse then travels along

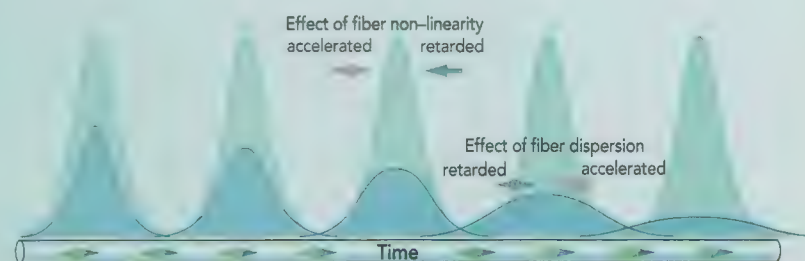
DISPERSION COMPENSATION



- 1 Ideally placed in the middle of the fiber-optic cable, the Spectral Inverter reverses the frequency spectrum. The pulse distortion generated as the signal travels through the first half of the fiber is removed after inversion by the second half of the fiber. This technique can be used over any length of fiber but is most effective over very long lengths.



- 2 Light at longer wavelengths is reflected at the input end of the Chirped Fiber Bragg Grating whereas light at shorter wavelengths is reflected from the far end. A 4 inch grating can cancel the delay characteristic of 200 miles of optical fiber to produce a dispersion-free transmission link.



- 3 The creation and propagation of a soliton depends on maintaining the balance between fiber dispersion and the counteracting effects of fiber non-linearity. Unfortunately solitons generated in the 1.5 micrometer region can't be used on standard optical fiber cable because the dispersion is too high. Solitons require dispersion-shifted fiber where the dispersion in the 1.5 micrometer region is quite low.

the next leg of the journey, whereupon the previously fast moving frequencies now move more slowly. The result is that at the end of the second section of fiber, the pulse is elegantly restored to its original shape. This process can be repeated as many times as is required. Like soliton transmission, spectral inversion can be done using purely optical techniques so it is still possible to achieve very rapid pulse rates.

Another promising solution to the dispersion problem is to use a Chirped Fiber Bragg Grating (CFBG) compensator. This is a short piece of optical fiber, typically a few inches in length, that is exposed to intense ultraviolet light through a mask to create thousands of permanent miniature mirrors in the glass. These mirrors form a "Bragg Grating" which is simply a series of alternating regions of high and low refractive index. By tapering the length of these regions in a linear fashion a CFBG is formed. Light at longer wavelengths is reflected from the front of the grating while shorter wavelengths travel further into the grating before being reflected. The shorter wavelength light is, therefore, delayed relative to the longer wavelength. This is exactly the opposite effect of fiber dispersion.

While the concept of chirped gratings has been known for many years it is only recently that researchers have been able to chirp, or taper, the gratings and make them long enough to fully demonstrate the power of this emerging technology. This year the world's longest (5 inch) CFBG was manufactured by researchers at the Optical Fibre Technology Centre at Sydney University in Australia and used by Telstra Research Laboratories to transmit data at 10 giga bits per second over a record distance of 170 miles.

But there is another, quite different, approach to the whole problem of how to increase data capacity. Known as wave-division multiplexing (WDM), it depends upon the fact that glass fiber can carry many different wavelengths simultaneously. With solitons and spectral inversion, the idea is to squeeze as much data into a short space of time as possible – a technique known as time-division multiplexing. With WDM, the idea is to create a range of different frequency channels on which you can transmit different messages – rather like broadcasting on the radio. One can transmit information at a more leisurely rate on each channel, but the fact that there are many channels means that the overall throughput of data can be very high.

With WDM, dispersion is no longer so much of a problem, because the pulse rate on any individual channel is fairly slow. Furthermore, it is possible to exploit the whole of the frequency window offered by erbium amplifiers – a window ranging from 1.53 micrometers to 1.565 micrometers. According to some estimates, this could provide enough room for a hundred 10 GHz channels, which would mean a total capacity of 1 tera bit per second.

WDM already looks very attractive for short distance, high capacity links and forms the basis of a European system known as MUNDI. The idea of MUNDI is to get rid of the local telephone exchange and connect everyone directly using fiber. The fiber, in effect, becomes a broadcast medium. To make a telephone call, you are allocated a spare frequency on the optical ether. Your equipment then transmits a code which is then detected by the appropriate receiver. No switching or routing is needed.

Of course, on long distance routes switching will still be required, presenting yet another bottleneck. Even if the fiber optics can handle far more data, it won't do us much good if it can't be routed fast enough. It would be like building superhighways that you could only access via footpaths. But here too, new ideas are looming towards us like headlights on the horizon. Professor Allan Snyder, head of the Optics Sciences Centre at the Australian National University, recently unveiled the results of six years research into the problem of routing light with light. Such

"photonic switching" can guide a laser beam along different fiber optic routes far more rapidly than present methods which rely on electronic switching. It's the same story, in effect, as what happened to amplification. Electronics out. Photonics in.

Quite which systems are going to prove most practical and most commercially viable remains a matter of some dispute. Perhaps we will end up with a mixture of all of them. Nevertheless, Linn Mollenauer at AT&T thinks that it could prove possible to combine both the soliton and WDM techniques. "The two aren't mutually exclusive. WDM gives you lots of channels but it might be possible to use soliton transmission on each of them. That way you could get the best of both worlds and achieve extraordinarily high data transmission rates – much higher than anything currently envisaged."

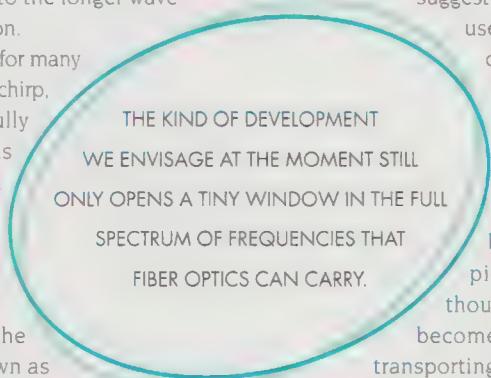
Large sums of money are at stake. Currently, the first long distance cable using optical amplifiers is being laid across the Atlantic connecting the USA, Britain and France. It will cost US\$750 million. A hefty sum, but calculations suggest that if its data capacity of 5 giga bits per second were fully used it could earn US\$10 million per hour. That means the cable could pay for itself within three days! Even assuming much more modest rates of uptake, the cable looks likely to pay for itself within months rather than years. The upshot for the consumer is that the cost of sending data is set to fall dramatically.

But lest one get carried away by the prospect of being able to put the entire world's telephone gossip on a piece of glass as thin as a human hair, it is a sobering thought to realize just how vast our appetite for data might become. BT's Peter Cochrane may see little future in merely transporting people's voices. But he sees enormous possibilities in bringing the techniques of virtual reality to the information highway. "We can teleport people into new environments, both computer generated and real-life. For example, if I mount a couple of tiny TV cameras on my spectacles together with a couple of microphones and give you a VR headset, then effectively you would feel as though you were sitting inside my body. We could share experiences. My dream is that you will be able to see what I see, hear what I hear and feel what I feel."

BT has already demonstrated prototype systems for engineers and surgeons who want to work at a distance by remote control. Such systems obviously demand far greater data capacities than are available on the telephone. Even after compression, broadcast-quality digital video signals require data links of 10 mega bits per second. And if you really wanted to do the human eye justice, estimates suggest that it is capable of resolving up to 2 giga bits per second – a figure comparable to the total data capacity offered by present-day fiber-optic systems. So even if fiber-optic systems were expanded to 100 giga bits per second, they still would not be able to accommodate vast numbers of people wanting access to the ultimate in high-resolution virtual reality.

Nevertheless, Peter Cochrane remains undaunted. "The amount of data a single fiber can carry is enormous. The kind of development we envisage at the moment still only opens a tiny window in the full spectrum of frequencies that fiber optics can carry. And we can always provide more fibers. The present 1.8 million miles of fiber in the U.K. is equivalent to 90 tons of sand. That isn't much raw material. The system is almost infinitely expandable."

There is no escaping the fact that the future of the information superhighway depends upon those miraculous spindles of glass. At the moment we are only making use of a tiny fraction of their true potential. One day, when we're all living in cyberspace thanks to solitons or multiplexed waves, fiber-optic cable will truly have come of age. The "Light Age."



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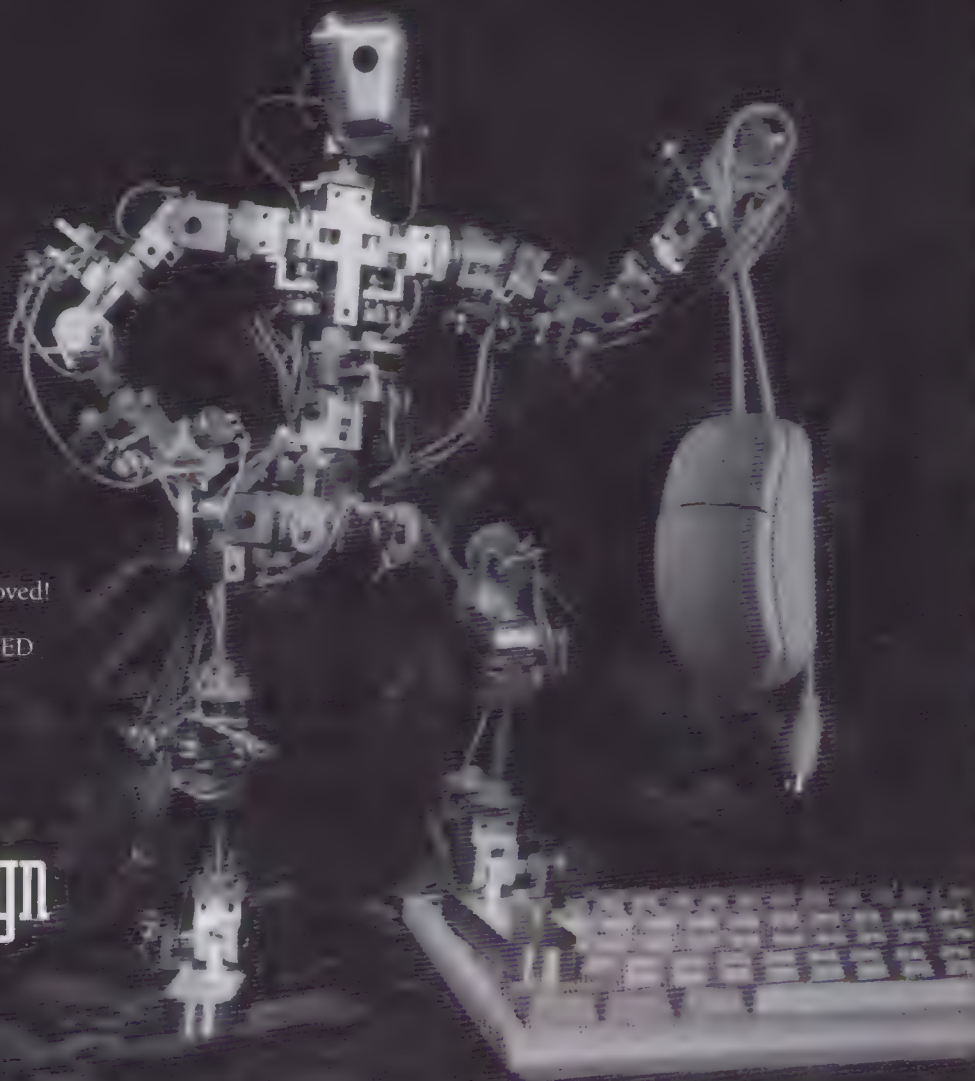
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apocalypse CULTURE

IT'S THE SILLY SEASON AGAIN. THE MILLENNIAL APOCALYPSE SILLY SEASON. LIKE TAX TIME AND ELECTIONS, IT JUST HAD TO COME AROUND. AS THE MILLENNIUM COUNT-DOWN TICKS OFF ITS LAST FEW YEARS, THE CULTS, MESSIAHS AND SNAKE-OIL SELLERS ARE OUT THERE PITCHING SALVATION FROM AN IMPENDING ARMAGEDDON. EACH HAS THEIR OWN SPECIAL PRICE, UNIQUE SELLING FEATURES AND THE TECHNOLOGY TO FULFILL THEIR VISION.

apocalypse CULTURE

by Ashley Crawford and Ray Edgar

Illustration by Murray McKeich

W RANCH DAVIDIANS, THE AUM DEATH CULT, PATRIOTIC bombers. Such movements, and their attendant media imagery – outbursts of savagery conducted in the pre-glow of the final flash that is millennial Armageddon – inevitably shock and horrify global audiences.

However, the Davidians and Aum are only the latest players in a role that has been enacted many times before, and indeed, the history of millennial cults and movements insists that far more will come to prominence before the year 2000. Christianity provides the archetype for millenarian angst. Many fundamentalist Christian groups believe that after a thousand years Satan will be released from the abyss in which God has entombed him. And depending on the interpretations by Christians, conspiracists, and all manner of cults, these millenarians look for a 'Satan,' the one who will deceive the nations scattered over the whole world. But millennial cults are not, as their name suggests, outcrops of extremism circulating only every thousand years. While they are becoming more prevalent as the calendar millennium approaches, apocalyptic cults have erupted constantly throughout recorded history. In today's millennial culture, the apocalypse, in its many forms, is being predicted by conspiracy theorists and extremist militia groups – such as those allegedly involved in the Oklahoma bombing in the USA. And Satan rides a black helicopter.

Millenarian cults have been most thoroughly documented in Norman Cohn's renowned historical analysis, *The Pursuit of the Millennium*. Cohn's work dissects the tradition of the foretold millennium, in which humanity would enjoy a new Paradise on Earth, free of suffering and sin. He surveys generation after generation being intermittently seized by the tense expectation of a sudden, miraculous event in which the world would be utterly transformed. During the Middle Ages, these expectations often became enmeshed with the social unrest which triggered massive changes in medieval society. What makes such expectations more dangerous and prevalent this century is technology.

Where, in Cohn's analysis, a John of Leyden could 'corrupt' his society with his apocalyptic pronouncements delivered naked to the townsfolk, today doomsday-cult leaders are more likely to announce their 'revelation' via the Internet, or create popular frenzy and wait for the mainstream media to cover their predictions, as the Aum cult did in Japan this year.

Cohn's analysis seems exhaustive and overwhelming in chronicling the sheer number of prominent movements that were scattered across medieval Europe awaiting apocalypse. However, his second book, *Cosmos, Chaos And the World To Come: the Ancient Roots of Apocalyptic Faith*, takes us back still further – to the world views of ancient Egypt, Mesopotamia and India, through the innovations of Iranian and Jewish prophets and sages, and through the earliest Christian visions.

H ELL IS AN IMAGE THAT HAUNTS CHRISTIAN CULTURES. Armageddon is hell's harbinger. But it is paranoia more than religion which is pervading culture and motivating us into millenarian activity. Amidst the chaos of our current lives conspiracy theories offer a chimera of salvation. Millenarian groups look for coincidences and synchronicities which will provide an explanation for social practices and abominable patterns they cannot understand.

It is the unknowing and uncertainty in society which generally occupies people who are ill- or mis-informed. The media's role is to either fully cultivate certain messages (propaganda) or further mythologies and stereotypes or prejudices. Today, new media – the Internet, desktop publishing, radio – can carry this 'news' faster, more economically and with an authoritative gloss, no matter how questionable its sources or how extremist or disaffected its progenitors.

Conspiracy theories often take on a biblical Revelations-like tone, delivered to groups who feel themselves to be persecuted. Thus the synchronous, serendipitous connections which form the conspiracy inevitably take on the knowing warm glow of apocalypse, or the cold comfort of global domination by a New World Order. While many have dismissed the conspiratorial doomsayers for their millenarian view, they may have a point in fearing the increased internationalism of major nations who, in acting as a benevolent peace-keeping bloc, could in fact become oppressive or even totalitarian. If Nazism and Communism provide the touchstones of totalitarianism and its attendant conspiracist propaganda (directed against Jews and Capitalism respectively), it must be remembered that the modern vision of the apocalypse was provided courtesy of Capitalist forces at Hiroshima.



who is worthy to open the book, and to loose the seals thereof?

WHEN IT COMES TO CONSPIRACY THEORIES, KNOWLEDGE IS a dangerous thing. The more information you have, the more ammunition there is to draw strands, currents, innocuous incidents and unrelated accidents into a masterful plan. Media, naturally, become key players.

To use a phrase from another paranoid individual, sci-fi author Philip K. Dick, conspiracists don't dream of electric sheep, because they don't get the chance to sleep at all, mortified as they are of the 'Information.' We know everything and yet nothing. But to those 'intelligent,' or maybe paranoid, enough to draw these strands together, the Revelation can be handed down or passed on. Informing as many people as possible of what is behind this obviously apocalyptic scenario becomes their mission. For those now willing to 'believe,' there is the solace of fellow true believers. What is alarming is when the true believers themselves decry pacifism and move towards a spirit of totalitarianism. Alms against arms.

A recent issue of Benetton's *Colors* magazine featured a shopping guide for the local terrorist, streetware arsenals that would be capable of strafing an entire neighborhood block – or even blowing one up. Handguns and explosives can be obtained for as little as US\$50 each. Technological resources available to the more organized groups, such as the Aum sect, include the ability to test nerve gas in sites overseas and quickly transport it back to Japan, or, more ambitiously, Aum's unsuccessful attempt to cultivate the Ebola virus from Zaïre. Then there are instructions for limited and/or mass murder freely and widely available over the Net. It's amazing what can be done with garden fertilizer. The Net has created a vastly different scale of communication from that used by radicals in the '60s who circulated recipes for Molotov cocktails on handbills.

IN THE CRUDEST SENSE, EVEN THE STORY OF JESUS COULD BE interpreted as a conspiracy theory comparable to the current obsessions with world government control expressed by U.S. militia groups. As Cohn notes, "...there is not a word in the gospels to suggest that Jesus ever claimed to be the Davidic Messiah, i.e. a military leader who would defeat Israel's enemies, re-establish the nation as a political power, and install himself as king." However, this was certainly the rumor of the time, and a major factor leading to Christ's crucifixion. Similarly today, it is

unlikely that a quote could be found from Boutros Boutros-Ghali claiming that America would be invaded as part of an operation to install a New World government, but, as among the Romans of Jesus' time, there are many 'believers' willing to accept that this is the U.N.'s unspoken ambition.

The logic of the American extremist militia movement is hard to gauge. Infiltrating the conspiracies is the oft-held belief that the world's end is just around the corner. And as this millennium draws to a close, apocalyptic imagery is once again becoming endemic in Western culture – the numerous examples of post-apocalyptic cinema inspired by the paranoid visions of Philip K. Dick form but one facet.

As the year 2000 comes closer, the popular imagination will embellish a future which will no doubt be bleak. As Cohn insists, "People were always on the watch for the 'signs' which, according to the prophetic tradition, were to herald and accompany the final 'time of troubles'; and since the 'signs' included bad rulers, civil discord, war, drought, famine, plague, comets, sudden deaths of prominent persons and an increase in general sinfulness, there was never any difficulty in finding them."

Over the centuries, ranters, the fraticelli, the apostolics of Gherardo Segreli, the brothers of the free spirit and various Catharist groups, to say nothing of extremist Islamics and other religious factions, have predicted the destruction of the planet.

The material is readily at hand to nurture new apocalyptic fears – plagues in Zaïre, 'ethnic cleansing' in Bosnia, and China's continued hostility with the rest of the planet. Even the nuclear nightmare of the '50s and '60s, briefly forgotten with the end of the Cold War, has returned, with electronic extremist groups firing missives of war, plague and famine – but mostly war – against both minorities and governments. But the centuries have rolled over such fear mongers before, so we may well look forward to the year 3000. The Aum sect leader, Shoko Asahara, may have predicted a specific date for the end of the world, but he was by no means the first to get it wrong.

With all these extremist doomsayers one might well agree with Sartre, that hell is living with other people. ■

And I looked, and behold a white horse. He who sat on it had a bow; and a crown was given to him, and he went out conquering and to conquer...

Another horse, firey red went out. And it was granted to the one who sat on it to take peace from the earth, and that people should kill one another; and there was given to him a great sword...

So I looked, and behold, a black horse, and he who sat on it had a pair of scales in his hand...

So I looked, and behold a pale horse. And the name of him who sat on it was death, and Hades followed with him. And power was given to them over a fourth of the earth, to kill with sword, with hunger, with death, and by the beasts of the earth...

I saw under the altar the souls of those who had been slain for the word of God and for the testimony for which they held.

And they cried with a loud voice, saying, "how long, O Lord, holy and true, until you judge and avenge our blood on the earth?"

Revelations 5:6 (The Six Seals)

A NEW AMERICAN CLASS IS GROWING FROM THE ASHES OF
WACO AND OKLAHOMA: A CULTURE OF WHITE TRASH, BLACK
CHOPPERS AND PARANOIA...



vietnam, 1968

black



los angeles, 1995

the
the far-flung,
saver-destroyer,
fast-flying rotor-blade
provider-waster
powers of empire
is home to roost

by McKenzie Wark

Imaging by Greg O'Connor

thunder

THEY HAUNT THE SLEEPLESS DREAMS OF AN INSOMNIAC culture. Nightmares of empire: that the horrorshow of mechanized violence visited upon nameless, faceless enemies abroad will come home to America, like the four pale riders. The black helicopters are here, hovering not over the rice paddies of Vietnam but over the corner store and the 7-Eleven. Or so some citizens seem to imagine.

It's not hard to see why the black helicopter should make such a vivid image of fear. As Michael Herr wrote in *Dispatches*, his classic book on America's Vietnam War, "... in my mind it was the sexiest thing going; saver-destroyer, provider-waster, right hand-left hand, nimble, fluent, canny and human; hot steel, grease, jungle-saturated canvas webbing, sweat cooling and warming up again, cassette rock 'n' roll in one ear and door-gun fire in the other, fuel, heat, vitality and death, death itself, hardly an intruder."

This image returns in Francis Ford Coppola's exceptional movie of the American empire's heart of darkness, *Apocalypse Now* (1979). It comes home to haunt us in John Badham's film *Blue Thunder* (1983). The story takes place in L.A. The helicopter is suitably black and evil-looking, and has hi-tech surveillance and weapons systems, all concocted on the pretext of fighting drugs and crime, but actually meant for more sinister purposes.

In the Arnold Schwarzenegger vehicle *The Running Man* (1987), Arnie plays a chopper pilot in some sinister, futuristic police outfit, ordered to fire on food rioters. That black, inhuman saver-destroyer condenses a host of unnameable fears and angers all across 'free-thinking,' gun-toting, small-town white America.



FLAMES RISE FROM A CLUTCH OF BUILDINGS, WHILE THE NEWS anchor talks about dead women and children. This macabre info-bite isn't about terrorists or death squads in some tinpot despot's corner of the world. This is Waco, Texas: heartland USA. This coverage of the burning Branch Davidian compound raised the temperature of American popular paranoia.

That was in 1993. There's a little museum there now, run by former Branch Davidian Mrs Amo Bishop Roden. As she told *The Boston Globe*, "It's become a shrine to a lot of activists, religious and political. We see a lot of militia members and a lot of people who are just fed up with encroaching government control. I hear a lot of people say, 'Next thing you know, tanks will be coming into my living room.'"

Out in the field nearby is a granite headstone that lists the 80 victims of the fire. The people who placed it there call themselves the North-east Texas Militia, and they came in their green army-style fatigues to unveil it with considerable ceremony on April 19, 1995 – the second anniversary of the raid.

The very same day former First Infantry sergeant Timothy McVeigh allegedly parked a rental truck out front of the federal government building in Oklahoma City, packed with a bomb made from fertilizer and diesel fuel – a convenience store terror weapon. McVeigh had traveled twice to the Waco killing ground, now a sacred site for the paranoid revival in American popular politics. At the time of writing, McVeigh is in police custody but refuses to cooperate. He calls himself a "prisoner of war." That is how he makes himself seem significant, not least to the Right-wing fringe groups for whom he is a brand new martyr.

Linda Thompson calls herself the Acting Adjutant General of the Unorganized Militia of the United States. She says seeing the flames of Waco on TV changed her life. She made her life seem significant by giving up her law practice in Indianapolis to defend this strange phantom of the political movement known as the militias, where nightmares about black helicopters swooping over America and tanks crashing through the living rooms of patriotic citizens fire the hearts and minds of folks like former army sergeant McVeigh.

Thompson's theory about McVeigh is that he was coerced by the government into parking the 2-ton bomb-in-a-truck in Oklahoma. The Federal Bureau of Investigation (FBI) and the Bureau of Alcohol, Tobacco and Firearms (ATF) are in it together, conspiring with the Israelis. She believes black helicopters menace her and come right up close to her family home in Indianapolis. "We are living in a police state and the increasing

power of authorities will cause a civil war," she told *The Times* of London. "When they come, I will be armed and waiting." An estimated 27 per cent of Americans are prepared to join her, if the polls on the subject are to be believed.

"Unmarked black helicopters are flying over our land in violation of all local and federal laws, carrying on their secret business, and taunting and terrifying the

populace. During the latter half of 1994 alone, hundreds of reports from all over the land of these ominous black craft have been circulating by word-of-mouth, via small 'underground' and 'patriot' newspapers, and on special-interest computer bulletin boards, although very few of such sightings are reported by the mainstream newspapers or radio and television."

So begins *Black Helicopters over America: Strikeforce for the New World Order*, by the popular conspiracy writer Jim Keith. It's published by IllumiNet Press, whose list includes *Secret Cyphers of the UFO-nauts* and *Space Aliens from the Pentagon*. Keith is also editor (or perhaps author) of *The Gemstone Files*, a compendium of the labyrinthine conspiracy theories around the killing of President Kennedy. In *Casebook on Alternative 3* he compiles, in his ever modest prose, stories and documents purporting to show that the rich elites of the world run a secret space-migration program to Mars in order to escape pollution and over-population.

All of which is, quite frankly, crank literature. It is of interest for two reasons. Firstly, with *Black Helicopters*, Keith has hit upon a truly popular and contagious paranoid story, with deep and

diverse roots in American media culture. "According to reports from American citizens from around the nation, military aircraft have been seen spraying over certain residential areas and particular remote targets where patriots live.... The persons in the helicopters pointed 'scopes' at the teenager.... These choppers are equipped with the most hi-tech of surveillance equipment.... Connections of black helicopters with cattle mutilations seem to have confused the issue – perhaps purposely.... A black helicopter with white U.N. insignia was spotted near Thompson falls, Montana.... Ed Barr, an Occidental business consultant, said he was sitting outside with a client, a Vietnam veteran, who got some instant bad memories when the airships showed up."

Then there's the Tactical Helicopter Offensive Response (THOR) program in Los Angeles. As one 'eye-witness' said of the US\$5 million machine: "This mother hears through walls, fires 4,000 rounds a minute and peeks down dresses at 1,000 feet." It contains a computer terminal "hooked into every database in the country." The purpose of this secret program emerges from some statements made by covert military and government sources in a certain document, which refer to "anti-terrorist capabilities" for a "worst case scenario – armed insurrection."

The 'certain document' in question is Badham's movie, *Blue Thunder*. THOR doesn't exist, but the movie begins with a very ominous message that all of the technologies shown in this fiction certainly do. Is Badham's movie based on a real fear of what Keith calls a "Frankenstein monster of a police force" deploying the vectors of airborne surveillance and firepower, or are the sightings of such machines over Montana or Tennessee all nightmare flashbacks from the movie?

The second thing about Jim Keith's black helicopters is that when people seize upon a narrative like this as an explanatory device with which to make sense of the fears and frustrations of everyday life, it points to a failure of what Keith calls the "McPaper press" in failing to hold the attention of a significant minority. A minority, moreover, whom one might usually expect not to have too much trouble with the dominant viewpoint: the great broad mass of almost middle-class, almost middle-aged, almost middle-Americans that Roseanne Arnold seeks to embody when she speaks with pride on her TV show of "respectable white trash like us."

If more proof were needed of the national mood, consider the top-rating TV show, *The X-Files*. It's a familiar TV genre: our heroes are partners allied against evil. They work for a secretive government agency. One is a straight-up all-American white male hero, the sidekick offers a slightly different take. It's exactly like *I-Spy* from 20 years ago, except that the sidekick isn't black comedian Bill Cosby but a white woman, and the evil isn't the Commies any more, it's aliens in UFOs who drill holes in people's teeth, or weird covert biological experiments gone wrong. Our heroes work for the FBI, but most of the other government agents we come across are involved in cover-ups and conspiracies involving powers so dark they may not even be human. The story is the same, only the object of paranoia that our good guys battle has become so unstable that it can't even be located in some foreign country. It's invasion of the body snatchers, weekly on TV.

WHY ARE SO MANY MIDDLE-AMERICANS SO ALIENATED from mainstream media that they might put their trust in cultists, conspiracy theorists and gun-toting vigilantes? One doesn't have to believe in a New World Order or an international conspiracy of Jewish bankers, to name two popular themes, to see why American society is experiencing a widespread and manifold form of what German social theorist Jürgen Habermas identified in the 1960s as a "legitimation crisis."

For a government to work, it needs its people to believe not only that it acts, most of the time, in most people's interests. It needs people to believe that it is rational and just. It needs people to believe that their role in the political process is significant. Ever since the revolutionary movement overthrew the illegitimate colonial administration of the British, the former colonies who became what social scientist Seymour Lipset famously described as the "first new nation" achieved legitimacy through the formal guarantees of representative democracy, a bill of rights and a written constitution. We hold these truths to be self-evident. By the people, for the people.

Legitimacy involves the people in government just enough to secure their consent, but as Habermas argues, this involvement is purely formal. If and when large groups of people come to feel that their demands are not met by the process, or that their lives are treated as insignificant, or that government has overstepped its bounds and extended its tentacles too far into everyday life, a crisis of legitimacy threatens. The American state has just such a crisis now.

Once upon a time, Americans all had at least one thing in common: no matter whether they were rich or poor, white or black, their life chances all depended on the health of the national economy. Not any more, according to Robert Reich, who taught at the Harvard Business School before elevation into the

Waco, Texas: The Branch Davidian sect's headquarters burn. A black helicopter hovers overhead.



Austral/ Jerry Hoefler

conspiracy is the motive force of history

Clinton administration as Secretary of Labor. Reich holds that in the new global economy, the fortunes of a wealth strata of what he calls "symbolic analysis" – educated folk whose work doesn't soil their hands – no longer depends on the fortunes of the nation. They are part of global management, production and marketing chains, connected to sweatshop labor in the Philippines and skilled factory workers in Korea. They and the businesses they work for are no longer invested, economically or politically, in the well-being of the blue-collar workers in America who used to actually make the things that were designed, managed and marketed. Their interests lie in the co-operative management of international trade, not the welfare state.

When Jim Keith cites his hearsay reports of mysterious troop movements and paramilitary operations, involving sightings of the U.N. insignia, Russian hardware or Belgian troops, he makes literal a fantasy that may indeed have some basis in reality. Describing one such "operation," he claims that "the training reportedly involved familiarization with techniques of 'urban warfare' such as house-to-house searches, just the sort of skills which would be

required if these troops were used to subdue the American populace rather than, for instance, bandits in Somalia or homegrown dictators in Haiti."

What we have here in a populist, grass-roots form is the suspicion turned to fear that the semi-skilled, semi-literate white American is no longer guaranteed a significant and protected life, secure in the arms of a military-industrial complex that looks after its own. Add to that the declining fortunes of the small-farm sector, propped up, ironically enough, by farm subsidies at home and a vigorous but vain policy of subsidized trade deals abroad, and you have a new disenfranchised sector – respectable white trash.

The spooky connections between black helicopters and cow mutilations Keith recounts are true conspiracy-buff stuff. These folk legends more commonly involve flying saucers, only lately that rather nebulous paranoid fantasy is coming down to Earth. It's not aliens who are out to get middle America, it's the new Masonic lodge of big capital and big government, "this club of bloody-handed blue-bloods" armed with lasers and spying with computers, ready to take the "next 'baby-step' of totalitarian control in the United States."

Keith's black helicopters are a media-fueled twist on an old tradition on the fringes of American political culture that political scientist Richard Hofstadter identified some 30 years ago in his book *The Paranoid Style in American Politics*. American political life, he observed, attracts "uncommonly angry minds," sometimes prone to fantasize about the persecution of the great American people by sinister foes, and indeed sometimes about their personal persecution by Masons, Communists or even black helicopters.

THESE "MOVEMENTS OF SUSPICIOUS DISCONTENT" BASED ON paranoid fantasies have a long history. In *The Pursuit of the Millennium*, historian Norman Cohn tracks from the Middle Ages the religious cults that imagined themselves an 'elect' persecuted by pervasive powers of evil. But the key moment for most conspiracy buffs was in the year of revolution, 1776, in Bavaria, when Adam Weishaupt founded the *Illuminati*, a secret society who believed in reform along rational, Enlightenment lines. The *Illuminati* were an influence on some Masonic lodges in Europe, and attracted the interest of German intellectual figures such as Goethe and Herder, but they were soon stamped out in their native Bavaria as tracts denouncing them as an anti-Christian conspiracy began to appear.

The tall tales of the *Illuminati* and their conspiracy crossed the Atlantic in the early years of the new republic of the United States. Conservative Christian forces in New England, at odds with Jeffersonian democracy, were a fertile seedbed for stories of a secret Masonic plan to overthrow Christian civilization. The basic structure of this popular myth remains unchanged today, although it has been the Masons, the Jesuits, the Communists, the Fabians, the Jews, the Arabs, Aliens, or in Keith's version, the U.N. who are the agent of evil. All that has changed over time is that where once the threat was perceived to be on the margins of American society, many stories in the paranoid style now assert that the evil force has taken over government. Believers affirm their significance by styling themselves as the last true holdout against the body snatchers, whoever they may be.

It is not just the fringe dwellers of political culture who are susceptible to such paranoia. James Forrestal was so paranoid about the Russians that he feared they may have planted antennas in the flagpoles outside his office. And he was Secretary of Defense to President Truman. More recently, *The New York Post* wasn't the only media outlet to blame the Oklahoma bombing on the Arabs, on the slender pretext that there had been a Muslim convention in town: TERROR-LINK GROUPS MET REGULARLY IN OKLAHOMA CITY.

It has greatly amused the more liberal press to point out that the only terror-link groups one can point a finger at are the state-based militias and the so-called patriot networks they form. But the press also tended towards paranoia in their futile attempts to link McVeigh to the militias. It's the culture of paranoia, its rise against the background of the crumbling legitimacy of the American state, and the social context in which paranoia flourishes that are the important issues here.

The growth of American empire and the penetration of the media vector throughout American culture has provided the paranoid style with a host of evil images to work with, and hence the characters and the plots get more and more elaborate, global and fanciful. But always, it has the structure Hofstadter identified. Conspiracy is the motive force of history. Things happen, not because of complex and contradictory political and economic movements, but because a select band of very significant people make it so. We are always on the brink of apocalypse. There is just time, if true believers rally, to turn back the tide. The enemy is always a figure of excess, come to steal our everyday pleasures





from us, amoral libertine that he is. This enemy has special powers of diabolical origin.

In the current scratch-mix of white-trash paranoia, the black helicopters are the insidious sign, the portent, the omen spreading across the landscape, of the shape of things to come. Hi-tech weapons, computer banks keeping records on citizens, invasive surveillance and 'psych-war' – all deployed against the true patriots. Behind the plot lies a sinister cabal, the New World Order of "vampiric controllers," run by the U.N. They are coming with their unconstitutional police powers to round up the patriots and put them in concentration camps, and they are coming soon. The patriots must form their own militias. They are coming for the arms the constitution guarantees you the right to bear.

"Martial law would be declared, and suddenly we would be living in the kind of world we have only seen in Russia or the Third World, a place where the populace has no rights whatsoever, and where the President can reshape the nation according to any Fabian-bred dystopian plans his wife pleases."

This is the paranoid style in American politics today. As Hofstadter said 30 years ago, "style has to do with the way in which ideas are advanced rather than with the truth or falsity of their content. So the questions that follow are: from where did this particular version of the paranoid style arise and why are we experiencing one of its not infrequent waves of popularity?"

One doesn't have to look to this fringe literature or the movies to find black helicopter stories. In his remarkable book on contemporary Los Angeles, *City of Quartz*, Mike Davis describes the use made of the helicopter by the Los Angeles Police Department. Michael Herr's "saver-destroyers" really did come home to roost, particularly after the Watts riots of 1965. Davis writes that "as part of its 'Astro' program LAPD helicopters maintain an average 19-hour-per-day vigil over 'high crime areas,' tactically coordinated to patrol car forces, and exceeding even the British army's surveillance of Belfast. To facilitate ground-air synchronization, thousands of residential rooftops have been

painted with identifying street numbers, transforming the aerial view of the city into a huge police grid." This Panopticon in the sky also offers infra-red cameras and 'Nightsun' spotlights, the effectiveness of which can be seen, by those not fortunate enough to live in L.A., in Dennis Hopper's film *Colors* (1988).

Black helicopters may be a novel nightmare for middle America, but they are a commonplace of ghetto life in the 'high crime' neighborhoods of L.A. Waco has a forgotten precedent in the paramilitary attack on a black activist group in Philadelphia, but that is too long ago and provokes little sympathy in the memories of white America's TV-culture heartland. Ishmael Reed has made himself highly unpopular with his book *Airing Dirty Laundry*, in which he argues that the white, middle class indulges in the abuse of drugs and each other as much as the black underclass. Reed says that poverty, desolation and violence in rural America continue without remark, while black males function as the image of total culpability for the crime that urban minority neighborhoods suffer, the indignity of social neglect, and aggressively attentive policing – helicopters and all

Reed may sometimes come close to sounding as much a crank as Jim Keith, but the comparison would not be a fair one. The truth is that minorities like the black community have for a long time felt abandoned by the project that is the nation. Listen to the urban hip hop music of the Bronx or Compton and one finds the paranoid dreams of the insignificant aplenty. But if one is black and poor in America, one would have to be completely nuts not to be a little paranoid. A novel and disturbing development is the revival of aggressively paranoid discourses among the newly insignificant white, working class and lower-middle class. In the interview with Jim Keith in this issue, Keith admits to having links to the patriot movement which, like many paranoid populist movements before it, is not shy of mixing the suspicion that big business no longer needs it and big government no longer cares for it, with race-hate, pure and simple.

"Is civil war imminent? Do we have to shed blood to reform the system? I hope it doesn't come to that! But it might." So wrote Timothy McVeigh, in a letter now in police possession. McVeigh may have been to meetings of the Michigan Militia. The trailer park where he lived for a time in Kingsman, Arizona, was in an area the Arizona Patriots used to test home-made bombs. Comrades from the First Infantry say that after he failed to get in to the Special Forces he became angry and alienated and came to believe that there was a microchip secretly implanted in his butt – a favorite image of the Christian version of the far-Right conspiracy paranoia, also featured in a gripping two-part episode of *The X-Files*. But more important than his past connections to the paranoid right, is the fact that he has become a martyr to their cause in the present.

"is civil war imminent?"

mcveigh





PARANOID CULTURE MAKES GREAT USE OF A RANGE OF available media, old and new. Four of the commercial short-wave radio broadcasters in the United States play far-Right patriot-inspired programs. There is a network of small presses and papers. The Simon Weisenthal Center has located 50 groups using the Internet, most having sprouted since 1993. Then there's the American Patriotic Fax Network. Cyberpunk novelist William Gibson once said of technology that "the street finds its own use for things." So does the rural grass-roots of this rhizomatic, autonomous, decentered schizoculture. One thing about people who feel they are insignificant – they tend towards a desire to signify. To make meaning. To make a world in which they figure, living large. Larger than life.

The militia, with their XL-size fatigues in fancy patterns, have probably no more than 100,000 members across 30 U.S. states. Beyond that one has the weird matrix of constitutional fundamentalists, survivalists, no-tax nuts, gun-rights folks and so on. But their views are on some points shared by more mainstream Right-wing culture. Christian Right presidential hopeful Pat Robertson refers to a conspiracy of "European bankers." G. Gordon Liddy, despite his Watergate conviction, now has a radio show syndicated to over 200 stations on which he has given advice on how to shoot government agents – in the head. As Adam Gopnik observes in *The New Yorker*, "It is no great exaggeration to say that *American Survival Guide* is just *The American Spectator* with bazooka ads."

What I described in "The Price Is Right" (21•C, 2.95) as the 'Anti-Public Sphere' has done a thorough job of challenging the legitimacy of government. This Right-wing network of private foundations, media outlets and thinktanks doesn't so much have a contract with the American government, but a contract out to kill it. The irony being that far from improving the lot of people trapped in declining rural and industrial sectors, reducing the size of government is more likely to

be done in the interests of those corporations and individuals whose fortunes depend on the main or competing in the global arena. They are cutting themselves free from a welfare state that puts a rickety floor, but a floor nonetheless, under the fortunes not only of the black and hispanic urban minorities, but increasingly also under the white rural and industrial margins.

McVeigh came out of a town called Pendelton, a rural community some 20 miles from Buffalo in New York state. As Joyce Carol Oates wrote in *The New Yorker*: "To grow up in Pendelton, New York, is to know oneself distinctly marginal, wherever the fountainheads of significance, let alone power, they are surely not here, nor are they even within easy driving distance." But, says Oates, this is of little significance compared to where this man traveled: he served in the Gulf War, amid all that sand and heat and all those war machines. He wanted to move on

to the Special Forces. Rejected, he drifted through the Michigan Militia and perhaps on to Oklahoma City. "Where we come from in America," says Oates, "no longer signifies – it's where we go, and what we do when we get there, that tells us who we are."

That's a great way to wind up a column in what's left of the liberal press in America. But there is something lacking. Pendelton may be as nowhere as the places in Idaho and Louisiana from which Jim Keith collects his black helicopter stories, but one thing is all-pervasive in America. The virtual geography of the media makes it as easy here to dream of black helicopters and bright uniforms and the great scheme of history as it is in L.A. or New York. The dreams that draw the McVeighs out of the Pendeltons, seeking to become a part of a world of action and significance, reach right out into the sticks and hicktowns, and right on in to the dreams and ambitions of people for whom there is nothing where they are but to leave. We no longer have roots, we have aerals.

The information coming in on those aerals tends to point to the growing insignificance of certain rural and industrial economies and cultures, and to the indifference to this fate of the rest of the nation. The fantasies of black helicopters, the sense of vital, personal urgency to defend the constitution from the usurpers – all this makes the great plains and folds of the American heartland seem like a place of significance once again. Oklahoma happened on the anniversary not only of Waco, but also of the battle of Lexington – on April 19, 1775 – the opening shot in the revolutionary war.

'MARK FROM MICHIGAN' IS A SHORT-WAVE RADIO RANTER that Jim Keith quotes as an "authority" on black helicopter sightings. Tim McVeigh may well have heard him. As Mark says of Waco: "the next time this happens, we are going to be armed to the teeth. We are not going to be reading history, we are going to be making history." The dream of everyone rendered insignificant by the abstract and inaccessible powers of capital, strategy and communication that shape history is to make history personal again, to bring it down to the everyday level and the everyday place.

It is the dream of an insomniac – paranoiac – culture, haunted by the unspoken consequences of the far-flung, fast-flying rotor-blade powers of empire, quite possibly returning home to roost.



**"the street finds
its own use for
things" gibson**

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MASONIC PLOTS, BLACK HELICOPTERS, GOVERNMENT CONTROL, OCCULTISM AND UFOS ARE ALL FODDER FOR MILLENNIAL CONSPIRACY THEORIES. JIM KEITH PRESENTS THE CASE FOR LIVING IN 'JUSTIFIED FEAR.'



by Rosie Cross ▲ Illustration by Christopher Waller

JIM KEITH HAS BEEN RESEARCHING CONSPIRACIES FOR 30 years. Keith's research reflects the usual agenda for conspiracy writers: Masons, black helicopters, government plots, occultism, metaphysics and UFOs. The 45-year-old Keith claims that his interest in UFOs began at the age of seven, following a face-to-face confrontation with a little gray being from outer space. In the '60s, Keith became embroiled with the hippie movement, and during the Vietnam War he was a conscientious objector.

His first book, *The Gemstone File* published in 1992, centers around a semi-secret document relating to the Kennedy assassination. In 1993 he edited *Secret and Suppressed*, an anthology of heretical and concealed documents.

Keith's 1994 *Casebook on Alternative 3* deals with the 'Alt 3' scenario featured in a 1975 British television show which dealt with secret plans from an elitist movement to abandon an Earth which they believed was devastated by pollution, and set up bases on the Moon and Mars. "I believe that Alt 3 was a British TV hoax," says Keith. "But my thesis in the book is that even though all the details of Alt 3 were bogus, they parallel actual conspiracies that are going on in truth."

Rosie Cross: Is there a network of conspiracy theorists?

Jim Keith: Sure. Conspiracy, occultism, holistic people, all kinds. The different fields like UFOs, conspiracy, New Age and so forth tend to stick to themselves and don't care too much for the others. What I do is synthesize what's valid in different disciplines.

I'm not really a card-carrying member of any of them. I have connections with the Patriot Movement in the U.S. It's very pro-Constitution and anti-New World Order. I am connected with a lot of people with the anarchist movement, people in the occult historical research field who spend time digging into the antiquities of occultism, and then I know New Age people.

There is a quote from Robert Anton Wilson on the back of *The Gemstone File*: "How much of *The Gemstone File* is true? Not much I'd say, but I do feel the basic thesis – America's conquest by gangsters and thugs – is substantially accurate, even though most 'good citizens' would rather die, even in prolonged torture, than to face the facts." Is that still a good description of America today?

That's a good question. As far as *The Gemstone File* not being true, surprisingly there have been many details which I doubted which I have had validated.

The 'Gemstone File' was a conspiratorial document of roughly 1,000 pages, put together by a character named Bruce Roberts in the early '70s. What most people have seen is the skeleton key of about 30 pages, however, that larger document, varying from 300 to 1,000 pages, is actually floating around. I know of three or four people who have copies, however I have not been able to pry a copy of the original 'Gemstone File' out of them, nor have any other researchers who have done books on the subject; the reason being that people have set incredibly high dollar figures on copies.

In the wake of the paranoia after the Oklahoma bombing, Keith's latest offering, *Black Helicopters Over America*, is timely. "It deals with this mysterious phenomenon of black helicopters which have been seen all over America and often linked with mysterious troop movements and shipments of war material, and strange things which are taking place in terms of a consolidation of the New World Order," says Keith from his home in Reno, Nevada.

"Their alleged mission is the facilitation and implementation of a World Government by delivering into all regions of America an army of international troops that would be used to control any rebellion within the population. These black, unmarked helicopters have come to represent an oppression of free thought and a threat to national sovereignty."

While it's easy to have doubts as to the validity of such 'research,' Jim Keith and his acolytes have a decidedly large following. "I have 300 different black helicopter sightings in *Black Helicopters Over America*," he says.

For all of his conspiracy fears, however, Keith retains a healthy sense of humor. When asked whether he believes that the Illuminati are a forceful group controlling global economic and political power, he whispers "Yes..." and then laughs loudly.

How do you verify material?

If I am not convinced something is true, or I don't have hard evidence, then I admit I am speculating. That's a rarity in the conspiracy field – most people tend to make blind allegations knowing that most people interested in conspiracy will accept them. Speculation is a useful tool – a lot of conspiracy material is hidden, and the only way you can get further leads is through supposition.

Does a conspiracy researcher have a particular lifestyle?

I drift between different worlds. I spoke at a Patriot Group meeting a few days ago here, and found them to be perfectly charming people.

White and nationalistic?

There are elements of that, but if the Patriot Group takes over, I will be the first to be hung. Back in the '60s I was closer to a Weatherman than a Green Beret. But the majority of so-called 'patriots' in America are concerned about the erosion of the constitution, about multinationals taking away the last of the resources in the country. They are pretty much like conspiracy researchers, maybe not as weird as you might imagine.

Wasn't the last great conspiracy Ollie North and the Iran-Contra deal?

I get good conspiracies coming in virtually every week, the latest being the 'Monarch Mind Control File'. They were obtained through hypnotic regression from a woman called Cathy O'Brian, who had elaborate scenarios about being programmed for multiple personalities and being involved in a lot of drug running, highly believable, but incredibly science fictional, with implants and CIA programming and so forth. I tend to doubt the

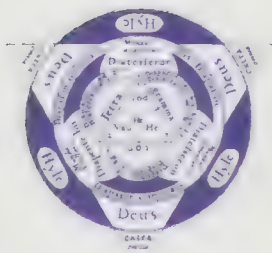
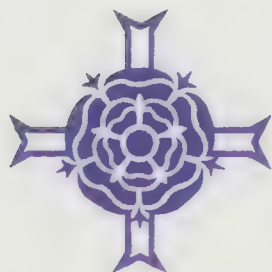
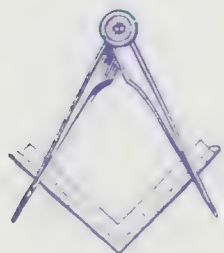
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the way it looks to me is a to take the unwashed masses back return to feudalism to primitivism...



Geometry of fear: Symbols of the Freemasons, Illuminati and Rosicrucians, (in descending order) which conjure conspiracies in the hearts of many. A diagram depicting a 17th-century interpretation of the cabbala is shown at the bottom.

validity of these things, but I can corroborate a lot of what's being said and happening. Cathy O'Brian maintains she was programmed by CIA connections and high-level occultists in the Reagan administration.

To what end?

Good kinky Satanic fun, I guess!

Who killed JFK?

I have my odds-on favorites. I go for the curious scenarios like *Nomenclature of an Assassination Kabal*, written by an associate of Jim Garrison, the Texas lawyer featured heavily in Oliver Stone's movie "JFK". The author of *Nomenclature* maintains that J. Edgar Hoover and Lyndon Johnson were at the top of a large action network called Permindex, situated in Switzerland, and his details are so well corroborated, that it really is my favorite take on the assassination. It's well known that J. Edgar Hoover was a transvestite; what is not as well known is that he was a 33rd degree Mason – he was the presiding Mason in Washington, D.C. People say that's one of the reasons he could never be dislodged from the FBI, and I'm quite interested in the Masonic connection to a lot of the conspiracies

There are so many threads of the Illuminati. Which one would you care to tackle?

Of course the Masons and the Rosicrucians prior to that. My sense is that the Masons were really a refurbishing of the Rosicrucians. Search for the source of other Rosicrucian connections and you get into some really curious backgrounds such as Sufism and Arabic influences... the cabbala of course. My belief is actually that the cabbala is a key to the writings and philosophy of what one would call the Illuminati. It is revelatory to consider that the main book of the cabbala is called the *Zohar* (The Book of Light) i.e., illumination. That really is a key to understanding where they are coming from.

Another book that creates some amazing speculation, is *The Holy Blood and the Holy Grail* and their work on the Messianic trends and the Priory of Sion, which may or may not be a factual secret society. But if it doesn't exist, it should, because it sure answers a lot of questions about the Illuminati.

How many members are in the Illuminati?

I've heard different speculations. Dr John Coleman's latest book, *Conspirator's Hierarchy: Committee of Three Hundred*, placed the figure at that, although he didn't offer any proof to suggest this was true he does have a complete list of these 300 people, but absolutely no proof that they are actual members. I really don't know if Coleman is correct. Eustice Mullins, on the other hand, suggests

there are 500 in the committee, but by the same token he has no proof of that.

How are these people nominated to be on the list?

British aristocracy and international banking figures mainly.

Do you believe that?

I think that's about right. I see a critical nexus in the history of these groups taking place around the 1500s, where you see international bankers coming primarily from Venice and financing the political machinations of the British aristocracy and taking up with a lot of characters involved in home-grown witchcraft. Very much into the Templarian Baphomet type stuff. English society in the 1500s, 1600s and going into the 1700s was riddled with witchcraft, and it looks to me to be a melding between these cabbalistic influences, primarily out of Venice, linking up with the witches of England. This was after the Albigenian heresy where a million Gnostics were killed.

What is the agenda of the Illuminati?

The way it looks to me is a return to feudalism, to take the unwashed masses back to primitivism, and for this noble clique of some hundred or thousand individuals to lord it over the masses in some grander manner than they have been able to do in the past. There are apparently also plans for a lot of population reduction, as is seen in publicly accessible political documents.

Any Illuminati connections with Rupert Murdoch?

I wouldn't be surprised. I have no hard information to prove that. I am certain he rubs shoulders with the top elite. As to whether they're card-carrying Illuminati and have a Rosie Cross embroidered on their underwear, I am not sure. I think they are thick as thieves and their philosophy goes back to an Illuminas orientation. There is a lot of speculation about how you actually become a member of the Illuminati. *The Holy Blood* talks about this overall battle plan of the elite to install a World King on the throne from the lineage of King David, and that seems to be the Masonic template as well, the restoration of the temple and the enthroning of the Messiah.

Is all your research, and *Black Helicopters Over America* especially, disseminating information in the public interest?

If I didn't think so I wouldn't be working in this field. I really believe in the power of the pen, and that the exposé of these plans can really set them back. That's why I am working.

What will happen with cult movements towards the year 2000?

The demonizing of the Right wing in America will only result in more dessention and the fracture of public opinion. I wouldn't be surprised if Waco was not the greatest recruiting device Americans have ever had.

Can you define conspiracy?

There is a fine line between paranoia and what Robert Anton Wilson has said: "There is no word in the English language for 'justified fear.'" ▲

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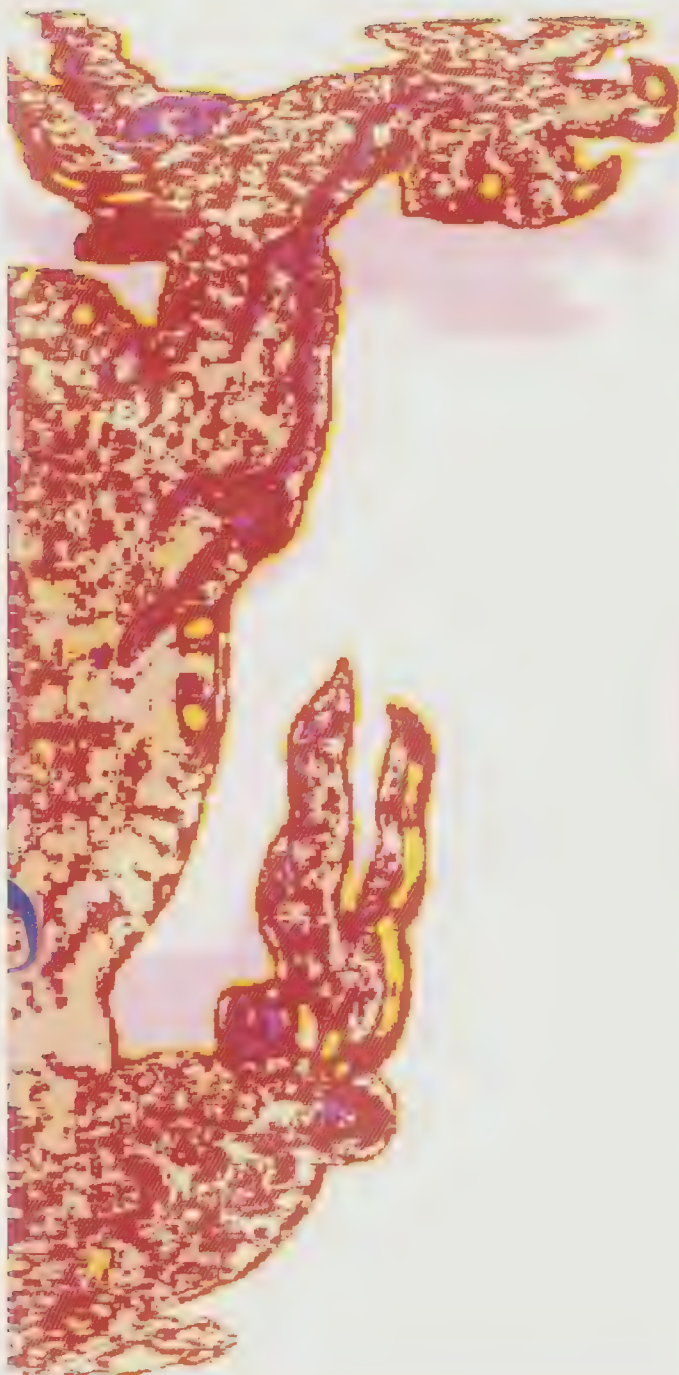
armageddon

by Azby Brown

Illustration by Gregory Baldwin



FOR A SOCIETY ALREADY LIVING IN FEAR OF ARMAGEDDON, THE RECENT APOCALYPTIC VISIONS OF THE AUM CULTISTS AND KOBE EARTHQUAKE LEFT JAPAN IN SHOCK. BUT THE END OF THE WORLD ENDED UP A BATTLE BETWEEN THE MEDIA, THE POLICE AND THE GOVERNMENT.



WELCOME TO ARMAGEDDON. We have waited for it patiently and, like a true friend, it has arrived. Here in Japan, Armageddons come and go with the frequency of changes in the weather, rises and falls in the exchange rate, the introduction and cancellation of new canned beverages. Devalued Armageddons to be sure

From March 20 until May 25 of this year, fear of a new Armageddon held Japan in thrall, thanks to a very peculiar media blitz. It began with what is now known as the "Subway Sarin Episode," in which poison gas was released inside several Tokyo subway cars, killing 12 and injuring dozens. Just as the crime was unprecedented, so was the subsequent feeding frenzy. For throughout the three months of round-the-clock, nonstop coverage, in fact up until the on-camera apprehension of the main suspect – Aum Shinrikyo cult leader, Shoko Asahara, who had been in hiding since the gas episode – no one had been officially charged. The police, although cooperating fully with the media in terms of providing access and places to set up cameras, had made no statements.

For three months the media could offer nothing but hearsay and speculation based on police leaks. Indeed, the manner in which the police proceeded with their investigation and the total lack of discussion in the media of the issues this raised has left many Japanese intellectuals reeling. For it was clear that the National Police Agency, Japan's version of the FBI, had far exceeded its legal powers and was demonstrating that it could, in the case of an 'emergency,' exercise many powers not specifically granted by law. And Armageddon, of course, is an emergency

THE IMMINENT THREAT of the eradication of all life as they know it has loomed heavily in the minds of the Japanese people for centuries, primarily through Buddhist images of the destruction of the universe. But as a phenomenon, it fully embodies the modern Japanese experience. In the early 19th century, Armageddonites declared that the foreign barbarians then knocking at the gates in the name of free trade, though so inferior to themselves as to be considered human in only the broadest sense of the word, nonetheless bore the means to subjugate and annihilate the Japanese race. Until the overthrow of the Shogun in 1868 and the establishment of a militarized propagandist state, such talk was heresy; in fact, any change whatsoever in the political structure of the nation, the government claimed, would bring with it chaos and mass destruction. But the transformation of this heresy into policy – bringing with it both the ability and will for the brutal pre-emptive conquest of Asia; universal revilement; and the hubristic underestimation of the Allies', particularly Americans', willingness to fight over what would seem to be a matter of principle – led ultimately to the retaliatory mass exterminations of 1945. As early as 1850, the doctor and student of Western culture Takano Choei, alarmed at the mistreatment and execution of shipwrecked foreign and Japanese sailors in Japan, had written: "The peoples of Europe hold human life to be of the highest value, and when seeing that our nation values neither the lives of foreigners nor even of its own people, will not weep at our extermination." And true, in 1945 few did

But after surviving the Armageddon of initial trade relations with the West, a subsequent apocalypse with the total destruction of Tokyo (aka "everything in the nation that mattered") in the Great Kanto Earthquake of 1923, and the nuclear and incendiary Armageddon of 1945, Japan enjoyed five decades of unprecedented freedom, prosperity and security. Then, in the early 1990s, unimaginably bad things began happening.

THE POPULACE had long believed that the government was managing its affairs well. The citizens could sleep at night secure in the knowledge that theirs was the most efficient, safest, conflict-free society in the world. Their economy was rapidly overtaking those of the Western world, and everyone could look forward to an exponentially improving standard of living. The greatest social threat was perceived to come from the growing number of foreigners who poured into the country during the boom years to fill menial jobs left vacant by native Japanese who had higher aspirations. Meanwhile, the media warned that foreigners were more crime-prone than rule-abiding Japanese, and in the late 1980s the country braced for a foreign crime wave – which never actually materialized. In a misinterpretation of police statistics, which went entirely unnoticed, the media trumpeted a twofold increase in the number of crimes by foreigners, but ignored figures which showed that one in 1,000 Japanese committed crimes while the figure for foreigners was closer to one in 10,000. That is to say, Japanese are 10 times more crime-prone in their own land than foreigners. Given that there are only a few hundred thousand foreigners living in Japan, and over 100 million native Japanese, it's clear that the crime wave the nation is experiencing is an almost entirely local phenomenon. And yet, police and media conspired to create a climate of xenophobia.

But the recent string of Armageddons really began when Japan's bubble economy burst in 1992. Without having to be told, Japan realized that its prosperity and economic strength was a sham foisted upon them by the government, banks and industry. The nation turned on a dime, shifting almost overnight from expensive French dinners in the Ginza to noodles at home. People were losing their jobs for the first time in post-war memory. This unprecedented disaster cast a pall over the entire nation, and for the first time this generation knew fear. But they were to know more before long.

The police's manipulation of the media in the aftermath of the Sarin Episode fits a previous pattern. The Aum cult was depicted as an evil threat. The authorities encouraged months of discussion and outrage before leveling charges or producing solid evidence.

A climate of emergency was established, although neither police nor government ever mentioned "terrorism," preferring the term "indiscriminate murder." The crime was perceived to be politically motivated, a threat to established authority. Perhaps this is 'rule number one' for the successful management of Armageddon in Japan: Use the opportunity to demonstrate beyond the shadow of a doubt who is really in control. Especially when that control has recently been cast into doubt. And cast into doubt it had been, a mere two months previously, in the aftermath of the Great Hanshin Earthquake which devastated Kobe on January 17, 1995.

AT 7.2 ON THE JAPANESE SCALE, the Kobe quake was more powerful than the 1993 L.A. quake, though not as strong as the Kanto Earthquake which devastated Tokyo in 1927. Japan had been preparing for earthquakes for decades, from earthquake-proof expressways to the automatic shut-off of city gas – or so it was believed. The real extent of the damage; the bumbling, hesitant and inefficient manner in which the relief effort was mounted; the total breakdown of communication between government agencies: all showed that Japan's vaunted disaster preparedness was a sham.

The media had a field day, for here was a genuine tragedy, an act of God, the Mother of All Acts of God. The television camera showed the thousands made homeless, huddled in frigid shelters, complaining about the lack of food. It showed, again and again, the toppled Hanshin Expressway and dozens of vehicles crushed with their occupants beneath. But mostly, it showed fires. Indeed, this should be 'rule number two' for managing Armageddon in the media: Make sure your sound-bites are accompanied by visions of flaming cities.



Aum cult leader: Shoko Asahara

As announcers struggled to master the basic task of reading long lists of the dead and missing on air, the nation watched slack-jawed as the death toll topped 500, then 1,000 then 3,000, finally ending at over 5,000 dead. But one fact was never reported in the Japanese media – though it found its way into the foreign press: the gas company, ignoring all safeguards, and despite the fact that the quake exceeded the safety limit threefold, had not shut off the gas. It waited over six hours to ascertain the true extent of the damage, and only then closed the big valve. Why? In order to "avoid inconveniencing customers." Earthquake engineering specialists

acknowledged privately that this reluctance to inconvenience – in reality, a desire to avoid complaints – was responsible for many of the large fires which consumed Kobe for five days. How many of the 5,000 dead were killed in gas-related fires? We will never know.

Perhaps most galling to the official powers was that volunteer groups and Yakuza were able to mount more effective relief efforts than the government. Beyond the tragedy, the Kobe aftermath was a scene of great empowerment. True, unlike in California where people in houses alongside damaged expressways immediately and unbidden rushed with ladders to help the afflicted escape, the volunteer spirit in Kobe took a few days to surface. But especially among youth, it was as if something worth doing had finally been found. While publicly applauding such efforts, the government and police repeatedly thwarted volunteer groups' attempts to act independently, even though the government had no alternate organization in place to deploy them. Many groups simply ignored the government and began to act on their own initiative, distributing food and blankets, locating housing, collecting and distributing funds. This was an unprecedented social phenomenon.

The coverage of the quake had a number of interesting corollaries. Most noticeably, the viewing public became accustomed to seeing the Japanese Self Defense Forces massed in public. Citizens seemed to feel that an appropriate role had finally been found for this unloved, bastardized military. Also, the police were shown in a role of selfless service, helping to dig survivors out from under the rubble. Initially, the more critical media organizations focused a considerable amount of attention on the government's ineptitude: Why wasn't the prime minister notified sooner? Why did the government refuse foreign offers of assistance, even though help was obviously sorely needed? Why were there no emergency communications systems in place? Such questions became more frequent and, on the eve of the Sarin Episode, dominated news programs. The fact is, though the Japanese press enjoys nominal freedom – and is certainly freer than Singapore's, for instance – all media organizations are informally required to appoint senior bureaucrats from the Communications Ministry to high-level posts. Generally, their role is symbolic, but during times of emergency they are able to communicate the government's will to the media. And the government is tolerant, but only to a point.

So, while the media coverage of Kobe was shifting into a routine of 'up' stories about rebuilding, and probes into corruption and negligence, the Sarin Episode occurred. Immediately, all stories about Kobe disappeared. Even as the *déjà vu* of grave announcers reading long lists of casualties filled the air, speculation began in private that the Aum cult, which has been suspected of involvement in an earlier gassing in Matsumoto, was responsible.

For a week or so the media concentrated on reconstructing the crime and describing the poison gas. The name of Aum Shinrikyo was never mentioned. But suddenly, as 2,000 police officers staged a raid on the cult's facilities in Kami-kuishiki-mura, at the base of Mount Fuji, the true frenzy began.

ASAHARA HAD PREACHED a doctrine of Armageddon, and it was possible he was trying to bring it about. The group was well funded and well organized and possessed military equipment. Gas attacks could occur anywhere, at any time – and some minor additional incidents did occur

The public, having barely overcome its trauma and sense of abandonment over the fate of Kobe, now suffered redoubled panic. Gas masks were stockpiled in family pantries along with flashlights, water, batteries and other newly purchased earthquake survival gear. Citizens were advised to report “unusual people” and cooperate fully with the police investigation. Roadblocks and random car searches became common.

Yet the police never once stated that the cult and its leader were suspects, they simply staged a massive show of force, wearing gas masks and chemical protection gear on camera lest the point of association be lost. From that day the police began rounding up high-ranking cult members, arresting them on unrelated charges (such as checking into a hotel under a false name) and detaining them for interrogation. It should be noted that in Japan persons may be detained for questioning for up to 60 days without being charged, during which time they need not be allowed to see a lawyer. Interrogations are brutal enough to have prompted inspections and an unfavorable report by the U.N. Human Rights Committee; and yet confessions extracted under these conditions play a central role in obtaining arrest warrants for others, and in subsequent trials and convictions

For the media, it was the story from heaven, with one problem: There was no evidence, no proof and no official statements from the police, who nonetheless used informal leaks to keep journalists updated on what the police were “probably” looking for and where. Also, the main character in the drama, Asahara himself, had disappeared from sight and could only be represented by file footage. In his stead several underlings gave press conferences and appeared on talk shows, achieving a kind of evil-tinged stardom. In the process, the visual vocabulary of the nation was expanded in unusual ways: massed police in their armor, fantastically blurred identities, uniformed cultists with electrode head-dresses, ramshackle cult labs chemical warfare gear on the streets of Tokyo – all against a remembered background of Kobe in flames.

Denied access to the cult’s facilities for weeks, cameras were located at the entrance to the compound, where an apparently abandoned coffee shop greeted viewers daily with the slogan “Welcome Victory!” painted in large letters on the facade. On TV news, talk and variety shows an endless parade of guests with “inside knowledge” of the cult began; mainly people claiming to be former cult members. Their identities were concealed in increasingly baroque ways, beginning with the simple pixelated blurring used to obscure genitals in Japanese porn movies, accompanied by Vocoder-like voice disguises. Over the two-month period in which these statements supposedly provided the only first-hand glimpse of life within the cult, their pixelated disguises became more elaborate, morphing into lace-like mosaics, shimmering iridescences, and from time to time, when names, signs, locations, even the weather, needed to be obscured in the name of safety viewers were presented with full screen, shifting, blurring, abstract designs of non-information. These were people with nothing but digital collages for faces, obscure figures speaking in genderless polyphony. For weeks rumors were reported as if they were facts.

Murai, a leading cult figure considered by the police to be a key witness to the investigation, was murdered Oswald-like on camera; his attack made easier by the crush of camera-operators and reporters who shielded the assailant from view. The murderer surrendered immediately and stated that he had “seen the reports about the cult on TV and decided to punish the bad men” himself. But there is reason to suspect he was a hit man sent either by Yakuza, who feared the target would reveal secret drug dealings, or by Asahara himself. It was also revealed that members of



Toxic avengers: Firemen clean the subway of toxic gas after the bombing.

the Self Defense Forces were cult members, responsible for paramilitary training and abductions.

Like the O.J. Simpson trial, people were drawn to the media coverage by a morbid fascination with the crime, the cult, and what can probably be described as the “workings of darkness.” The ultimate apprehension of Asahara himself, carried out *Fahrenheit 451*-like on live television on May 23, was a defining moment for Japanese media, and the subsequent stream of confessions from detained cult members were anticlimactic. Though decade-long trials will undoubtedly be held, and Aum will continue to garner media time, the entire episode is already on its way to being forgotten.

The power-centered subtext will continue to be read however. For what had been witnessed was the refinement of the Theater of Fear. Using the ‘emergency’ as a pretext, the police conducted a two-month long display of force, and assumption of extra-legal power, and no one complained publicly. In the wake of the Kobe fiasco, the government was forced to cope with the populace’s shocked realization that the greatest threats to the Japanese social fabric were not from foreigners or other outside influence, but from within the citizenry itself. Recognizing the media as a threat to the consolidation of control, the government used the police to outmaneuver them. This damaged the media’s credibility by demonstrating how dependent and uncritical it was willing to become in pursuit of ratings. The police imposed an effective form of censorship, and the media rolled over and panted.

OF COURSE, it took two Armageddons in quick succession to shift the balance so far in favor of the police. For despite the seeming ease with which fascist-era restrictions were imposed this year, the forces of a liberal constitution and those favoring more effective social control exist in an uneasy equilibrium in Japan.

Ironically, the era of politically critical art has just begun in Japan, and a grassroots movement towards the admission of wartime excesses has grown large enough that many hitherto taboo issues are being raised in print and on television. Just as they assumed that the country could help its citizens in the event of an earthquake, writers and artists have assumed that their freedom of speech would be respected, even defended, by the government in times of difficulty. Now however, a chill has descended over the intellectual community. It is as if it realizes that they are simply pawns in the hands of law enforcement officials and the freedoms they have enjoyed are only those granted them by an establishment which accepts no challenge to its authority, and which considers them merely too small to swat. ●

by Wilson da Silva

Imaging by James Widdowson



PLAGUE

F E A R S



Original Photograph: Tokyo Shinbun/Sygma, Original Ebola image: CDC/Austral

THE WORLD'S NEXT PANDEMIC MAY ALREADY BE SPREADING WITHOUT OUR KNOWLEDGE. A FORMERLY SMUG SCIENTIFIC COMMUNITY IS IN A BATTLE TO PROTECT HUMANITY FROM NEWLY VIRULENT AND RESISTANT STRAINS OF OLD DISEASES.

We may be able to split
the atom and send space
probes beyond the solar
system, but we may
never have mastery over
the germ world.

ANXIOUS SCIENTISTS IN SPACE HELMETS AND 'BUBBLE SUITS.' Troops blockading cities while panicked citizens try to break through quarantine lines. A doomsday virus spreading rapidly, its victims bleeding through the eyes while their organs turn to mush. No cure, no antidote, no vaccine. And no idea where this mystery killer came from.

If only this was science fiction. But these scenes have already flashed across television screens this year – during the outbreak of Ebola virus in Zaïre where the deadly pathogen killed hundreds. And it will kill again. Only next time, the world may not be so lucky: the spread may not be contained.

Speak to scientists and they will tell you that we may have to become more accustomed to such scenes in the decades ahead. Because Ebola, like a host of 'emerging viruses,' has the voracious capacity to spread. And conditions have never been better for such emerging diseases.

"The conditions of the modern world are uniquely favorable to the rapid global spread of infectious diseases," says Professor Jonathan Mann of Harvard University, a former head of the World Health Organization's AIDS program.

"A person harboring a life-threatening microbe can easily board a jet plane and be on another continent when the symptoms of illness strike," he says. "Few habitats on the globe remain truly isolated or untouched, as tourists and other travelers penetrate into the most remote and previously inaccessible areas in their search for new vistas, business or recreational. AIDS has demonstrated how swiftly remote or seemingly obscure health events elsewhere can become tomorrow's health crisis."

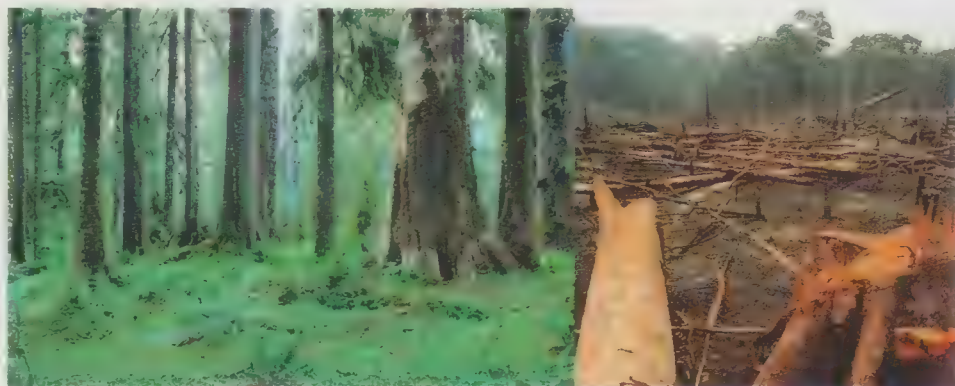
A leading authority on infectious diseases, Mann and a number of other leading medical researchers have been urging governments to set up a global disease-monitoring system capable of reacting to emerging microbial crises. He says that the world's next pandemic may well be circulating now, spreading and growing – as AIDS did – without our knowledge: plotting the history of HIV suggests that the pandemic could easily have escaped detection for another five years or more, he says.

More and more scientists, fearful of the rise of new infectious diseases, are urging a determined and sustained global response. They have good reason for being worried. The world at the end of the 20th century is a paradise for infectious diseases. Microbes thrive on large numbers of people living close together, and there's never been more of that than in the 1990s. Less than a century ago, only 15 per cent of the world's population lived in cities. Two decades from now, more than half of humanity will live in urban centers, most of them in the 'megacities' of the Third World. By then, some 24 metropolises are expected to have populations exceeding 10 million, mostly in countries that can ill afford the civil and health infrastructures that reduce health risks.

They could be the ideal factories for the incubation and eventual propagation of deadly outbreaks.

Then there's international air travel. More than one billion passengers fly on airlines every year, and more than 300 million of these take trips across national borders. Air travel continues to rise, having grown 17-fold since the 1950s. Add urban expansion into ecological niches such as rainforests rarely visited by humans, the burgeoning but untraceable trade in sex tourism, and the widespread use of unsterilized hypodermic needles – both in the under-equipped hospitals of poor nations and among drug users in both industrialized and underdeveloped countries – and you have the perfect setting for an apocalypse. It is a bomb waiting to explode. The only question is when. And which of the emerging diseases is going to detonate first.

As Nobel laureate Dr Joshua Lederberg has said: "The microbe that felled one child in a distant continent yesterday can reach yours today, and seed a global pandemic tomorrow."



Progressive infection: The decimation of forests is a factor in the re-emergence of infectious diseases.

AT FIRST, EBOLA TRIGGERS NAUSEA AND DISCOMFORT. WITHIN hours, this is followed by high fever, then bleeding gums and a vomiting of blood. Lots of blood. Inside the body the tissue walls of organs begin to break down, hemorrhaging profusely. Victims bleed from every orifice and continue to vomit blood and tissue even while unconscious. There is an occasional sound of tearing as organs rupture and intestinal linings are coughed up. Between three and five agonizing days later, the victim is dead, their insides liquefied, their organs disintegrated.

This is Ebola, the most frightening of the new diseases to appear this century. If there was ever a doomsday plague, Ebola certainly qualifies. It is known to have caused major outbreaks in humans only twice since it was first identified in 1976. Were it to spread widely, it could kill hundreds of millions around the world, researchers say. But there are other deadly new pathogens, as well as the re-emergence of diseases once thought vanquished and which, in the 1980s and 1990s, have shown a remarkable resistance to the pharmaceutical arsenal of the medical world.

Last year, scientists in Australia came across the world's newest emerging virus: Equine morbillivirus, a previously unknown organism that appeared without warning, killed 14 horses in southern Queensland within days, and hospitalized two men, one of whom died a ghastly, wheezing death.



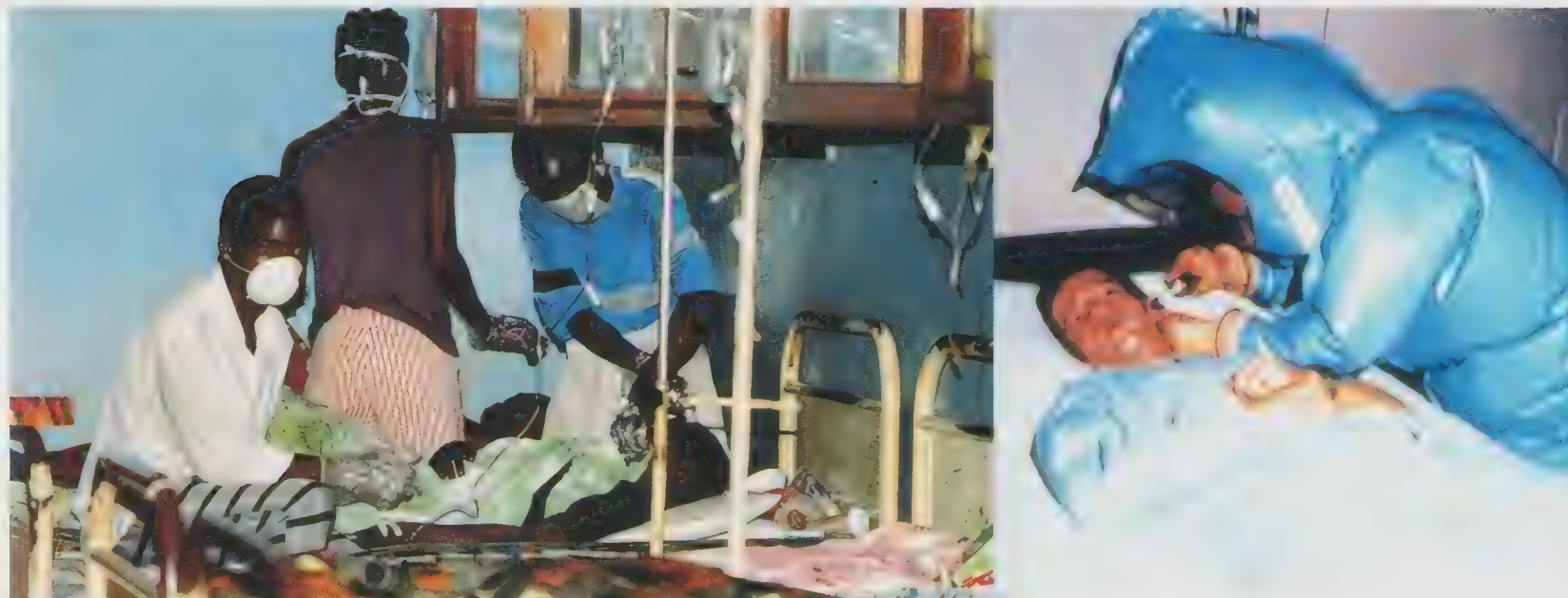
"No one can work out where the viruses go between outbreaks and no one's found the reservoir," says senior scientist Margery Kennett of Melbourne's Fairfield Hospital, which houses one of Australia's high security 'hot labs' for highly infectious diseases

"It appears and disappears, and no one knows exactly how it's transmitted. One 'index' case suddenly appears, and he's bleeding like mad, and all of a sudden, there are another 10, and it grows exponentially after that," she says.

Of the emerging viruses identified so far, Ebola is the most feared, classed as a 'Biosafety Level 4' – the highest level of risk "The only thing you can do is try to contain it," says Professor Frank Fenner, an internationally renowned virologist at the Australian National University. "There's no vaccine, no drug that has the slightest effect on it

War, when more than 2,000 United Nations troops contracted the disease, and many died. The virus, which is now known to reside in field mice inhabiting an ecological niche near the Demilitarized Zone, was later carried aboard ships to the United States where, in 1993, it caused an outbreak that infected 72 Navajo Indians in the U.S. southwest. All developed extreme breathing difficulties and kidney failure, and more than half died.

The virus then went underground. Since being identified by modern genetic-sequencing techniques, virulent outbreaks have been recognized in Greece and the Balkans. A milder form has been found in Scandinavia, large areas of the former Soviet Union, and in parts of Europe. In South Korea, 13 per cent of rats tested in Seoul carried antibodies to the virus, and a global study has since discovered antibodies in rats in North and South



Photos: Left: P. Robert/Sygma; Right: Sygma

At its previous known epidemic appearances, in 1976 and 1979, Ebola killed hundreds in Zaire and then Sudan before it was contained. It then disappeared. Another outbreak took place at an American research facility in Reston, Virginia, in 1989, when an infected monkey imported for experimentation transferred the virus to others, and scores of the creatures died. A number of lab workers also became ill. Luckily this strain of the virus, although under the microscope it looked exactly the same as Ebola, was not lethal to humans.

Ebola is a filovirus, or 'thread-shaped' virus, of a type which has only been seen by scientists once before. The first sighting of a filovirus was in 1967, when laboratory staff in Marburg, Germany, fell violently ill after handling a shipment of African green monkeys from Uganda. Dubbed the Marburg virus, this first recorded outbreak hospitalized 31 people, of whom seven died. Only three cases since have been definitively blamed on Marburg virus.

Other pathogens on the nasty list include arenaviruses, of which Lassa and Hanta viruses are of most concern. The first recorded outbreak of Hanta has been traced back to the Korean

Progressive detection: As this comparison of containment methods for the Ebola virus in Kikwit, Zaire and the U.S. Centers for Disease Control in Atlanta shows, the inadequacies in health and safety in poorer countries may impact on diseases spreading.

America, Australia, other parts of Asia, and Europe. A related cousin of the virus has been found in 80 per cent of adult rats tested in Baltimore. Although there have been no known Hanta outbreaks on the east coast of the U.S., some scientists speculate that the virus may be partly responsible for the high level of kidney disease among inner-city residents of Baltimore. One per cent of kidney dialysis patients at one Baltimore hospital have also tested positive for Hanta virus antibodies

Like Ebola and Marburg, no one knows where the Equine morbillivirus discovered in Australia last year came from. But scientists agree that they were extremely lucky that it was not easily transmissible – at least, not in this outbreak. "Once it's in your body, it's extremely virulent. Really virulent," says Dr Allan Gould, a molecular biologist at the Australian Animal Health Laboratory near Melbourne, whose genetic sequencing pinned



Increasingly, scientists are talking about the 1990s as the “post-antibiotic era.”

down the viral culprit. “The thing that stopped this from being a major catastrophe is the fact that it’s not very contagious.”

But Gould, along with other scientists interviewed, warns that such viruses are extremely unpredictable. Ebola, Marburg, Hanta, Lassa and Equine morbillivirus are all RNA viruses – viruses that mutate rapidly because they lack a ‘proofreading’ ability during replication. Each outbreak can represent a different strain, perhaps more deadly or more contagious than its predecessor. A virulent Ebola-style virus, if transmissible over the air like the Reston strain but, unlike the Reston strain, lethal to humans, could rapidly grow into a global epidemic. HIV, also classed as an emerging virus, is one which could not be contained once it emerged.

Already, antibodies to variants of Ebola have been detected in monkeys arriving in Western laboratories from Indonesia and the Philippines. Tests in the Philippines have also found antibodies in monkey handlers working for researchers in Luzon Island, and in the bloodstream of villagers and macaques on Mindanao.

Shortly after the resumption in 1990 of monkey shipments to the Reston laboratory, more than 80 per cent of the animals developed Ebola within months of arrival. The infection became so widespread, reaching other unconnected rooms, that all of the laboratory’s animals had to be destroyed.

Scientists to this day do not know the link between the Ebola variants in Asian monkeys and the prevalence of Ebola in Africa, and still have no idea where the virus resides between outbreaks. While the Reston outbreak suggests the Asian variants may not be fatal to humans, no one knows for certain.

“Despite historical projections to the contrary, we remain vulnerable to a wide array of new and resurgent infectious diseases,” Dr David Satcher, director of the Centers for Disease Control in Atlanta, said in a 1994 report to the Clinton Administration. “Our anti-microbial drugs have become less effective against many infectious agents. At the same time, our ability to detect, contain and prevent emerging infectious diseases is in jeopardy.”

Increasingly, scientists are talking about the 1990s as the “post-antibiotic era.” Doctors are coming across newly virulent and resistant strains of old diseases, such as tuberculosis, cholera, yellow fever, malaria, dengue fever, diphtheria, pneumonia, gonorrhea, meningitis and Rift Valley fever. Strains of HIV resistant to existing anti-viral drugs have also arisen recently. And these have not only been found in the developing world – an epidemic of the mosquito-transmitted dengue fever has broken out in Britain this year and at least 800 people have been infected. Second-hand tires imported from developing countries to the U.S. have carried mosquito larvae which hatched and recently caused a number of cases. Infections have also been reported in northern Australia

“Drugs that once seemed invincible are losing their effectiveness,” Satcher warned in his report. “Increased microbial resistance has resulted in prolonged hospitalizations and higher death rates from infections and has required much more expen-

sive, and often more toxic, drugs or drug combinations – even for common infections.”

New diseases have also been appearing: Lyme disease, Legionnaires’ disease, toxic shock syndrome, Hepatitis C and cryptosporidiosis, a recently identified microbial intestinal parasite that triggered the most widespread waterborne disease outbreak ever seen in the U.S. In Milwaukee, Wisconsin, cryptosporidiosis contaminated a municipal water supply and caused 403,000 cases of severe diarrhea of which 4,400 required hospitalization. In early 1993, a recently discovered strain of E.coli bacteria, known as O157:H7, contaminated the meat supplied to a hamburger chain, creating an infection that spread across state boundaries. It triggered bloody diarrhea and serious kidney disease and is known to have killed at least four children.

Coupled with the costs of treating HIV, the re-emergence of infectious diseases – due to population growth and concentration, deforestation and rapid geographical movements – has been estimated to cost \$120 billion a year in the U.S. alone, both in direct medical costs and in lost productivity. Despite the mind-boggling size of this figure, experts believe it is conservative.

What can we do? Scientists have been pressuring the politicians to take the problem seriously for more than a decade, since the emergence of the AIDS pandemic scuttled the smugness of a scientific community that had once thought the infectious disease battle largely won. The eradication of smallpox from the face of the planet in 1976 made it seem that humanity could eventually conquer all. The U.S. Surgeon-General even announced in 1969 that modern medicine had done away with the threat of infectious diseases forever

That type of cocksure attitude is not to be found in the medical community today. It is a community hunkered down for a major battle against the legions of new and old diseases that – even without a major global plague – are expected to keep scientists bogged down in microbial guerrilla warfare for decades.

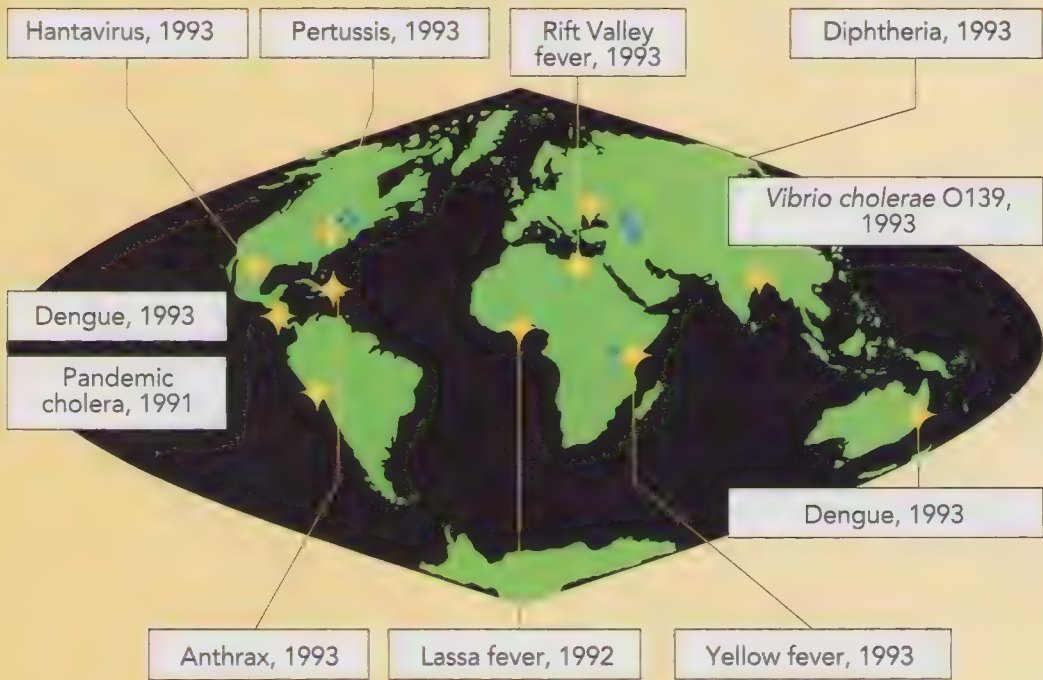
And yet, funding for institutes such as the Centers for Disease Control has been declining. The World Health Organization is meant to care for the Earth’s 5 billion people with a budget equal to that of a large metropolitan hospital in the U.S.

Ideally, the recent outbreak of Ebola in Zaïre will help scare governments into action. There have been some improvements: the United Nations General Assembly only a few years ago held an extraordinary session to consider the AIDS pandemic, the first time the forum had discussed a health issue.

But Mann and others want more than talk, they want action: “A global health approach is needed now to detect as rapidly as possible the next inevitable infectious disease pandemic.”

We may be able to split the atom and send space probes beyond the solar system, but it seems we may never have mastery over the germ world. Says William H. McNeill, author of the seminal work *Plagues and Peoples*: “Ingenuity, knowledge and organization alter but cannot cancel humanity’s vulnerability to invasion by parasitic forms of life. Infectious disease, which antedated the emergence of humankind, will last as long as humanity itself, and will surely remain, as it has been hitherto, one of the fundamental parameters and determinants of human history.” ■

P A N D E M I C P A N D E M O N I U M



THE POST-ANTIBIOTIC ERA: The world, at the end of the 20th century, is a paradise for infectious diseases. With exponentially increasing populations, particularly in Third World countries with inadequate health infrastructures, the risk of a new pandemic is extremely high. Add the increase in air travel, and outbreaks can occur in more industrialized centers. As scientists grapple with newly virulent and resistant strains of virus, they are describing the 1990s as the post-antibiotic era. The map above illustrates the recent outbreaks of emerging and resurgent infectious diseases.



The time of cholera: The rapid spread of cholera across Latin America is indicated by the colored zones.

E B O L A E P I D E M I C S

Ebola and a related cousin of the virus, Marburg, are so-called 'emerging viruses,' new organisms lethal to humans that are springing up around the world and causing fatalities before disappearing without a trace. Medical researchers remain baffled about their working and their origins.

KNOWN EBOLA CASES

DATE	LOCATION	INFECTIONS	FATALITIES
1976	Yambuku, Zaïre	277	256
1976	Nzara, Sudan	280	148
1977	Tandala, Zaïre	1	1
1979	Nzara, Sudan	34	22
1989	Reston, USA	4	0
1995	Kikwit, Zaïre	Unknown	180+

KNOWN MARBURG CASES

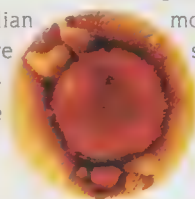
DATE	LOCATION	INFECTIONS	FATALITIES
1967	Marburg, Germany	31	7
1975	Zimbabwe	3	1
1980	Nzoia, Kenya	2	1



NEW VIRUSES AREN'T ALWAYS FOUND IN EXOTIC LOCATIONS. FOR THE FIRST TIME SINCE MEASLES — ALMOST 1,000 YEARS AGO — A MORBILLIVIRUS HAS HIT HUMANKIND FROM AN UNKNOWN SOURCE. ARE SCIENTISTS FACING THE GRANDFATHER OF YET ANOTHER DEADLY VIRAL STRAIN, THIS TIME FROM AUSTRALIA'S OUTBACK?

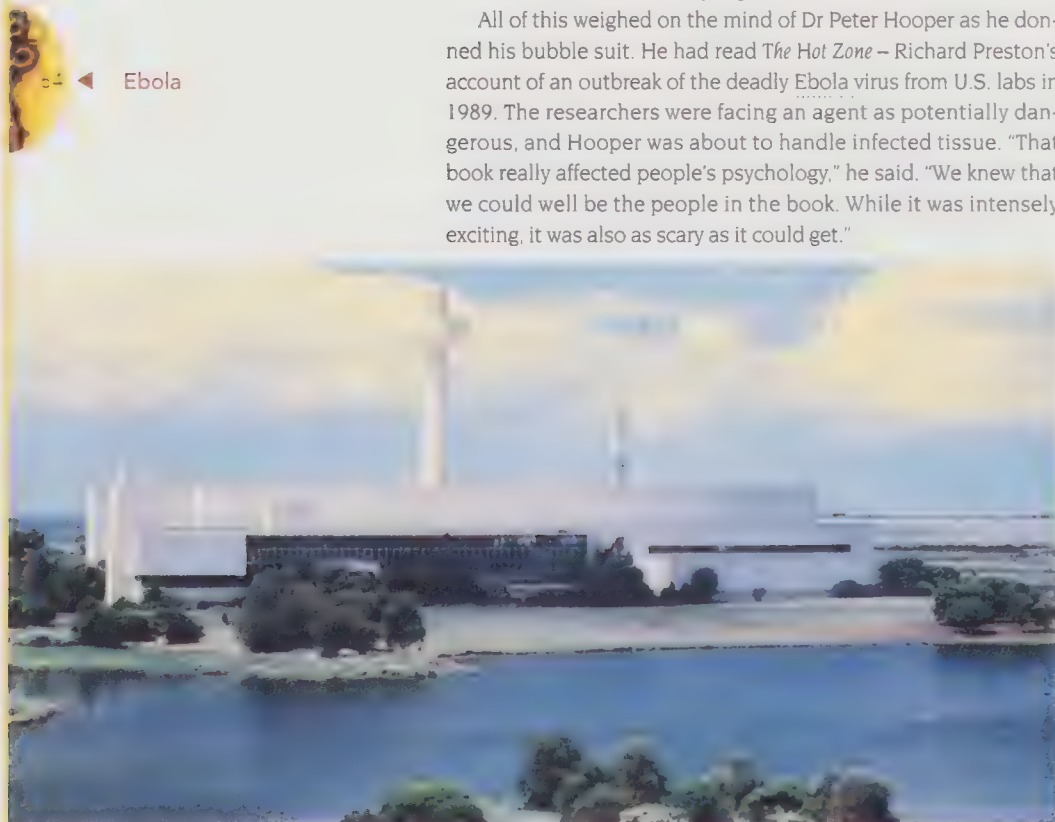


T B R E T B A

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THERE ARE SEVEN LEVELS OF CONTAINMENT AT THE GEELONG facility, each more rigorous than the last. At the highest level, scientists move in bubble suits, connected to individual air supplies. All liquid and solid waste – including the clothes worn by the researchers when they leave – is burnt, below the labs, at 120 degrees Celsius. The whole floor above the labs is taken up with air processing and cleansing facilities, to ensure that not even the smallest bugs can escape. Similarly, anyone contaminated with a deadly organism cannot leave.

All of this weighed on the mind of Dr Peter Hooper as he donned his bubble suit. He had read *The Hot Zone* – Richard Preston's account of an outbreak of the deadly Ebola virus from U.S. labs in 1989. The researchers were facing an agent as potentially dangerous, and Hooper was about to handle infected tissue. "That book really affected people's psychology," he said. "We knew that we could well be the people in the book. While it was intensely exciting, it was also as scary as it could get."



Bug Catcher: The CSIRO Australian Animal Health Laboratory outside Melbourne operates under tight security. With seven levels of biosafety, all waste and clothing burned and the whole floor above the labs taken up with air cleansers, no bug can escape and no one infected can leave.

Two horses from a local stable were brought into the hermetically sealed rooms of the Geelong facility and left with Hooper. He gingerly injected the test horses with infected samples – minced blood and tissue – from the Queensland racehorses. Despite the high level of security, he sweated. The holding pens were small. The horses could become agitated, kicking loose his air hose and exposing him to a potentially deadly agent. Thankfully, the horses were good-natured.

By the Monday, the microbial culprit had started revealing itself. Cells in most of the cultures prepared three days before had reacted: they were rupturing and coagulating into masses of dead tissue, a cytopathic effect indicating viral action. But this also caused more concern: viruses are usually difficult to grow quickly, yet this virus flourished on a wide variety of cells. This was one *virulent* bug.

Electron microscopy later revealed that the virus in the cultures had similarities to a large family of viruses called Paramyxoviridae, a large viral family that includes measles, canine distemper and a

new disease first seen affecting seals in 1994. But it had an array of protrusions like no other paramyxovirus. And no Paramyxoviridae virus is known to cause serious disease in both horses and humans. Soon after the Geelong discovery, scientists in Brisbane isolated a matching virus.

Further biochemical and serological tests were done to try and isolate which of the three main groups within Paramyxoviridae the virus fitted. But the tests came up blank: the results matched no known Paramyxoviridae. And it was still not clear if the virus was non-lethal, was restricted to horses, or whether the new bug was the cause of the disease.

On Tuesday, the pressure on the researchers grew. After six days in intensive care, the 49-year-old trainer died. His lungs had been ravaged by the disease, becoming such a liquefied mush that no samples could be taken. Instead, a high security post-mortem took kidney and spleen samples and sent them to the Geelong facility in a containment canister specially built by health authorities. In Geelong, the samples were inoculated into cell cultures.

"That all of a sudden increased the stakes, because we were possibly dealing with a disease that killed humans as well," said Selleck. "We still didn't know if he had in fact died of this virus or not, but we were under considerable pressure to try and resolve the problem. We later tested some serum from Rail against the virus we'd isolated from the dead horses. We found that Vic Rail had antibodies to that virus."

But not just antibodies: the actual virus too, indicating a virulent organism that could side-step human defences. "Normally, when the antibody level increases, the virus is cleared from the system and you are unable to isolate the virus," Selleck explained. "In this case, the virus was isolated in his kidney, even in the presence of a high antibody level in the blood. That indicates it was able to avoid the immune system."

With the virus isolated, researchers brought in two other horses and inoculated them with pure virus. If they developed the same symptoms as the Queensland horses and the experimental horses injected on Friday with tissue samples, the researchers would know for certain that they had unmasked the cause.

In the meantime, molecular biologist Dr Allan Gould prepared a series of tests in an attempt to identify the virus' genetic sequence using polymerase chain reaction (PCR) techniques. Gould knew that one of the serological tests had detected the merest hint of a reaction to a Rinderpest virus (a so-called 'morbillivirus' in the Paramyxoviridae family). But the reaction was so weak that there were major doubts about its accuracy.

So Gould designed a set of genetic traps – called oligonucleotides, or "oligos" in genetic engineering jargon – for the Paramyxoviridae family, and a set that would catch morbilliviruses only. Oligos are strands of synthetic DNA, 20 or so amino acid bases long, which genetic engineers create in any combination. Oligos act like a sequence of round and square wooden pegs: if the sequence of pegs is correct, all of the right pegs fall into the right holes, and you get a snapshot of the virus' genetic makeup. If the oligos bind with a target strand of genetic material, scientists know they have guessed the structure correctly.

In preparing the two oligos, Gould decided to hedge his bets on the second batch, which was to target morbilliviruses. He picked an area in the generic morbillivirus gene that had some similarities with morbilliviruses in particular, and some similarities with the Paramyxoviridae family in general. This wasn't quite a shot in the dark, more an educated guess, a hunch, that might still be way off the mark. Less than a day later, the results came through.

"None of them came up, except one – and that was against the matrix protein for a morbillivirus," Gould told 21•C. "The matrix protein is the most conserved in morbilliviruses, the least likely to change as it evolves."

Switching his focus to morbilliviruses, Gould then prepared oligos recently designed by British researchers which prime specifically for morbilliviruses. But they failed to react. His interest intensified, Gould set about designing his own oligos, zeroing in on the matrix protein of the mystery virus.

He got lucky. But the result was like nothing seen before. "The genome of this new virus was 50 per cent different from any other morbillivirus – every second amino acid base was different," he said. "And that's in the matrix protein, which is the most conserved. The oligos I'd designed just hung in by their toe-nails. It just worked. If I'd shifted the sequences by just five bases, we would have missed it altogether."

The resulting DNA fragment was sequenced and its structure checked over the Internet with large European viral databases in Heidelberg and Cambridge. The detailed databases confirmed that the Geelong facility had in fact identified a morbillivirus – but one with extremely remote similarities to known morbilliviruses.

"It's almost as if this virus is the progenitor of the Paramyxoviridae viruses; as if it's the granddaddy of them," Gould said. "At the gene level, we couldn't find any homology with anything in the databases. When we went to the protein level, yes, then we found similarities with the morbilliviruses."

Seven days into the process, the Geelong team had identified their likely culprit: the world's newest emerging virus and the first morbillivirus to infect humans since measles almost 1,000 years ago.

By then, 14 of the 21 racehorses originally infected had died in the Queensland stables. At the Geelong labs, 10 days after being inoculated with the diseased tissue, the first two experimental horses became ill, dying within 48 hours displaying similar symptoms. The other two, injected with pure virus, developed the disease within five days and died soon after. The other infected horses in Queensland recovered slowly, as did the stablehand.

The scientists quickly developed indirect antibody tests for the virus, which were pressed into service. "Every time a horse sneezed anywhere in Australia, we were testing samples the next day," said Selleck. "We worked every day for about two months, 11 hour days and through weekends. We had to make sure the virus had not spread."

Over the next two months, the Geelong facility tested 2,500 horse samples and 150 human samples. All proved negative. Authorities relaxed: the outbreak was contained.

BUT MYSTERY REMAINED ABOUT THE ORIGIN OF THE NEW VIRUS. Research teams have since tracked the disease back to a pregnant mare that was brought to the Hendra stables from a property in nearby Cannon Hill and died shortly after showing similar symptoms. Traces of the virus were found in the mare. Another horse from Cannon Hill died at around the same time, but its remains were destroyed before scientists could get to them.

The so-called "reservoir" of the virus remains a mystery, a fact that worries Dr Keith Murray, head of Geelong's Australian Animal Health Laboratory. "That is quite critical, because if we know the source, we can make some estimate as to how threatening that would be in the future," he said. "Also, if we know the source, we can, when necessary, take steps to block re-emergence."

Murray and his staff suspect the organism resides in a native animal, perhaps a marsupial, since many of these are unique to Australia. It may have happily inhabited an ecological niche in northeastern Australia for millennia, infecting marsupials and causing a mild flu. Perhaps it only occasionally jumped to humans, and perhaps the odd horse, as Europeans settled in the area just over 200 years ago. And now, urban expansion and deforestation may have disturbed the virus, causing it to come into contact with larger populations, making it noticeable. And deadly.

"We know from the gene sequence that it isn't a recent, single mutational shift. It's been around for a long time... and morbilliviruses, so far as it is known, are viruses of mammals," Murray said.

Seven of the infected horses survived, but Queensland authorities eventually sacrificed them all, in case the virus was capable of re-infecting. Meanwhile, scientists continue to search for the reservoir species, mindful that – like the recent outbreak of the Ebola virus in Zaïre – it could return to kill again.

Says Murray: "Everybody would wish that this was a single incident. But common sense says it could well come back, and we have to be as prepared as we can." ■



Mutant marsupials: While the infection was detected in Brisbane the virus is thought to have been a mutation of a flu virus jumping from marsupials to humans and other animals as Europeans settled in the outback.



(Left) Class detention: Work on the virus began in Class 3 biocontainment cabinets. **(Right) Bubble suit armour:** Vets in the seventh, and highest, class of biosafety, work in bubble suits to avoid contamination.

THE A G C I



No part of the planet would be spared. Some of the ejected material would be flung into space, only to fall back against the vegetation world-wide and barbecue exposed animals. The huge quantities of dust and debris would block out the sun, turning the entire planet into freezing darkness and making the nuclear winter scenario a reality. Greenhouse gases and other chemicals released from the impact would cause atmospheric pollution on a massive scale.

DENTAL IMPACT



GLOBAL FEARS OF
NUCLEAR ANNIHILATION
MAY HAVE ABATED, BUT
NOW SCIENTISTS ARE
SCANNING THE SKIES
FOR A FAR GREATER
THREAT — OBLITERATION
BY ASTEROID.

by Paul Davies

a storm of small meteors so intense that their combined heat would ignite displaced into the atmosphere would completely blot out the sun for months, plunging the pale into insignificance. As the dust settled it would blanket the Earth in a layer several inches thick. Clearly, cosmic impacts constitute a deadly threat to be taken seriously.



WHEN THE FRAGMENTED REMAINS OF COMET SHOEMAKER-Levy 9 slammed into Jupiter last year at more than 350,000 miles per hour they caused a multimillion megaton explosion; the impact had 1,000 times the destructive power of all the world's nuclear weapons put together. There was widespread speculation as to whether such a devastating event could happen here. The simple answer is: Yes, Earth is in the firing line.

In fact, the surface of the Earth is pock-marked with the traces of similar impacts – chilling testimony to the fact that comets and asteroids do indeed strike our planet. A repeat performance of any of the events that created these large craters would spell catastrophe for humankind.

Over the eons, a steady stream of rogue asteroids has sped into and out of the inner solar system, often posing a potential threat to Earth. Similarly, most comets lie safely in a cloud well beyond the orbit of Pluto, but now and again one will plunge Earth's way and blaze in the sky. Trapped in complicated elongated orbits, these bodies often have the habit of smashing into planets. The violent encounter between Shoemaker-Levy 9 and Jupiter is just the latest in an unrelenting bombardment that stretches back to the dawn of the solar system.

Astronomers have long known that in addition to the nine major planets in the solar system there are countless smaller objects, ranging in size from large rocks to minor planets several hundred miles across. Most lurk in the asteroid belt between Mars and Jupiter, but their orbits can be unstable, and occasionally one gets displaced and is propelled in Earth's direction.

So far, the science of cosmic impacts is very much in its infancy. To learn more about asteroids, NASA is planning a space mission to one later this decade. Until we gain a fuller understanding of these diminutive yet deadly objects, the true threat to humankind will remain unknown.

Even if astronomers manage to predict forthcoming impacts reliably, the question arises as to whether humanity can do anything about them anyway. A team of American scientists has been studying ways to head off the danger once an impactor has been positively identified. The spectacular damage is caused more by the high speed of asteroids and comets than by their size. They are, in fact, small enough to be moved around by human technology. If we definitely knew that an asteroid was going to hit Earth in, say, 10 years time, then corrective action could in principle be taken.

The effect of an asteroid or cometary impact with Earth is awesome. A body only six miles in diameter would strike with the force of 10 million-megaton nuclear bombs, vaporizing itself along with many cubic miles of rock and punching a hole in the Earth's crust over 40 miles in diameter.

No part of the planet would be spared. Some of the ejected material would be flung into space, only to fall back again in a storm of small meteors so intense that their combined heat would ignite vegetation world-wide and barbecue exposed

animals. The huge quantities of dust displaced into the atmosphere would completely blot out the Sun for months, plunging the entire planet into freezing darkness and making the 'nuclear winter' scenario pale into insignificance. As the dust settled it would blanket the Earth in a layer several inches thick. Greenhouse gases and other chemicals released from the impact would cause atmospheric pollution on a massive scale.

If the object landed in the ocean, the effect would be no less catastrophic. Waves the height of mountains would be produced by the blow. These would spread around the globe, adding to the mayhem by crashing into the continents and inundating vast tracts of land.

Even an object a mere half-mile wide would have a devastating effect. Although the planet would probably be spared wholesale ecological destruction, millions of people would die if the impact occurred in a populated area. Many more would succumb to the disruptive effects on climate and agriculture, and the ensuing economic and political dislocation. Clearly, cosmic impacts constitute a deadly threat to be taken seriously.

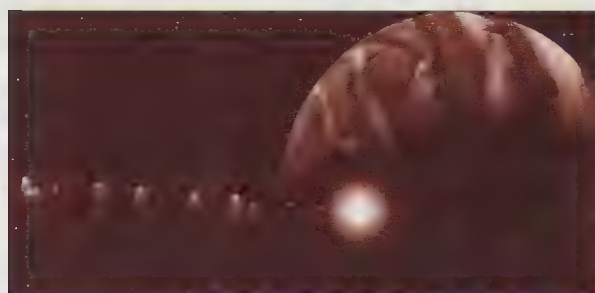
Scientists have been searching for clues of ancient 'impact events' on Earth. The fossil record suggests that sudden mass extinctions of plant and animal species have occurred episodically throughout history. For example, 250 million years ago, 90 per cent of species abruptly vanished. Asteroids or comets could be to blame.

As long ago as 1694, the astronomer Edmund Halley linked cometary impacts to global catastrophes, and the idea has been a recurring theme ever since. A popular theory is that the sudden disappearance of the dinosaurs, 65 million years ago, was the result of one impact, or perhaps a series of impacts. Support for this theory comes from the discovery of an unusual layer of the rare element iridium in rocks of that period. This material could be the dusty relic of an iridium-rich extraterrestrial impactor.

Some years ago, a geophysical survey conducted by a major oil company in Mexico revealed what could be the crater left by the dinosaur-destroying cataclysm. Named Chicxulub, it lies buried beneath sediment and half-concealed by the Atlantic ocean. The crater is about 300 miles across, suggesting a collision of titanic proportions.

Famous meteor craters, such as the mile-wide hole near Winslow, Arizona, are conspicuous because they are relatively young. The gentleness of the Earth's landscape belies our violent past: the effects of weathering and geological activity can rapidly obliterate the harsh scars of impact. In many cases, it is only with the aid of detailed investigation that scientists can spot where an object has struck. Each year, Gene and Carolyn Shoemaker – the American couple who, with David Levy, discovered comet Shoemaker-Levy 9 – roam outback Australia in search of undiscovered impact sites. Slow erosion makes Australia a crater-hunter's cornucopia.

How likely is a calamitous impact event today? Assessing the risk has been taken up by a number of scientists, under the encouragement of NASA. Geologist Dr Vic Gostin of the University of Adelaide recently scored a first by managing to identify the ejected rock from Lake Acraman, an ancient impact



Asteroid Belt: Fragments of the cosmic ice and dust of the Shoemaker-Levy 9 comet colliding with Jupiter in July 1994. Jupiter takes regular blows from cosmic bodies, acting in the capacity of Earth's bodyguard.

scar, 20 miles across, located north of the Eyre Peninsular in South Australia. The splashed material landed 200 miles away in the Flinders Ranges.

Meanwhile, astronomers have been diligently scanning the skies for the telltale signs of approaching asteroids. In March 1994, the Spacewatch Telescope at Kitt Peak in Arizona, dedicated to spotting asteroids heading in Earth's direction, picked up a 30-foot-diameter rock speeding past Earth. In astronomical terms it missed us by a whisker

The trouble is, an object less than one mile across is pretty inconspicuous unless it is almost upon us. Fortunately, computerized searches using optical telescopes can readily pick out these faint asteroids by their rapid motion, even when they are far away. If the object is followed for long enough, an orbit can be computed. Then the scientists can work out the chances of impact on the next approach.

Dozens of potential impactors have been catalogued this way but Duncan Steel of the Anglo-Australian Observatory in New South Wales, a leading expert on cosmic impacts, estimates that as many as 10,000 with a size of 45 feet or more are periodically swinging across the Earth's path. Like an aircraft flying through an unending hail of tracer bullets, sooner or later our planet must take a direct hit.

A mere 300-foot-wide rock exploding over the Pacific would produce a tsunami sufficient to wipe out Los Angeles, Tokyo or Sydney. Such an event is likely to occur every few thousand years

In 1993 alarm bells rang when comet Swift-Tuttle paid a visit. Astronomers tracking it calculated that when it returns, in 2126, the comet and the Earth might just be at the same point in space at the same time. Steel alerted the press, and the potential catastrophe made headlines around the world. Fortunately, follow-up investigations showed that the chances of a bull's-eye encounter are extremely slim, and the best current guess is that Swift-Tuttle will miss Earth by two weeks.

Identifying all 10,000 lethal asteroids poses a formidable challenge. The U.S. Congress asked NASA to conduct a feasibility study called Project Spaceguard, a plan to create a network of telescopes dedicated to seeking out all threatening bodies in a 20-year time frame. But even this ambitious program will leave out millions of smaller objects which, while far from Earth-shattering, are still capable of inflicting massive damage

On June 30, 1908, a rocky fragment the size of a city block exploded above the Siberian forest near Tunguska. The blast flattened trees over thousands of square miles and kicked up

enough dust to create spectacular sunsets for months. The force of the explosion was equivalent to a 20-megaton bomb, but mercifully nobody in this largely unpopulated region was killed. Had the object arrived a few hours later over Europe, the story would have been very different

Tunguska-scale blasts are likely to happen once or twice a century on average. Most will occur harmlessly over the sea or in remote wilderness, but from time to time, populated areas will take a hit. The British astronomer Victor Clube has conjectured that the debris from a fragmented comet striking Earth during the Dark Ages created the turmoil of that era and the historical fear of comets was due in part to the resulting disruption of civilization.

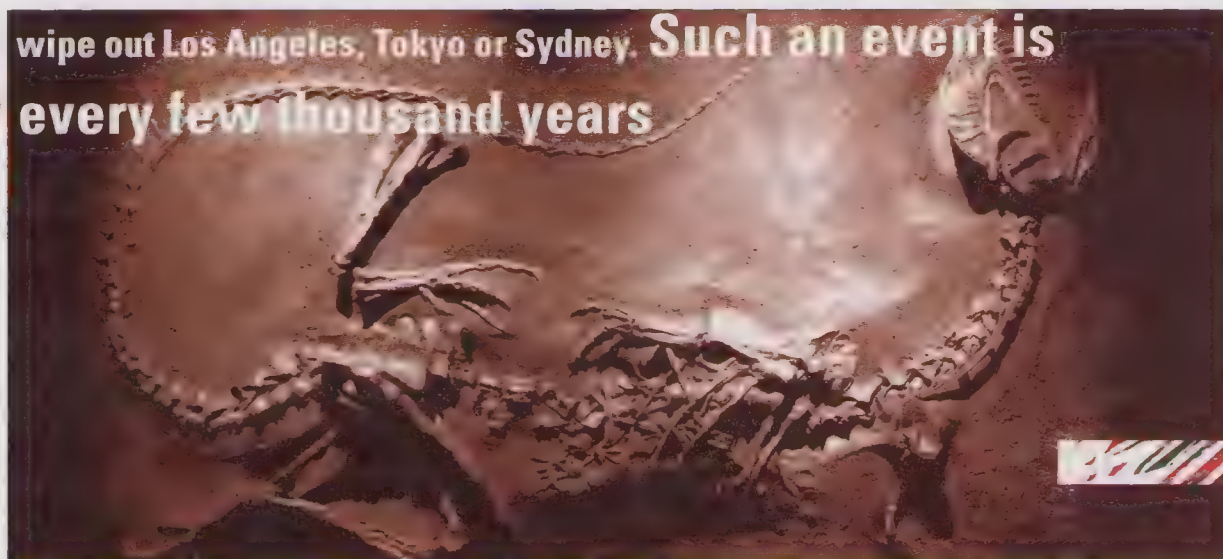
Duncan Steel also believes that the Earth is speeding through the debris of a large comet that broke up several thousand years ago and which periodically visits death and destruction upon us.

It would be impossible to track down all the menacing objects of this tiny size. We simply have to accept the fact that they can come literally out of the blue at any time. More worrying are the intermediate-size rocks, having between 10 and 1,000 times the destructive power of a Tunguska object, yet still almost invisibly small. For example, a mere 300-foot-wide rock exploding over the Pacific would produce a tsunami sufficient to wipe out Los

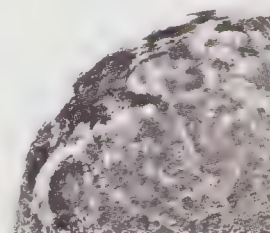
Angeles, Tokyo or Sydney. Such an event is likely to occur every few thousand years. Indeed, cosmic impact must be considered worse than large earthquakes and volcanic outbursts in terms of the level of threat to humankind. Yet we know even less about small asteroids and comets than we do about earthquakes.

Until recently, scientists assumed the solar system was more or less empty. However, space probes and improved telescopic techniques have prompted a radical rethink. It is not only the asteroid belt that harbors rocks and minor planets, but the entire solar system. Our region of space is, in fact, teeming with detritus — scattered relics from the birth of the planets.

The scars of primeval bombardment remain clearly visible on the rugged faces of the Moon, Mercury and Mars, where the absence of a dense atmosphere has preserved very ancient craters.



SIPA/John M. Maniot





THE SOLAR SYSTEM FORMED ABOUT FIVE BILLION YEARS ago from a contracting cloud of slowly rotating gas and dust. Most of the material accumulated at the center to make the hot ball which is now the Sun. The rest assumed a disk shape around the Sun, and it is from this disk that the planets and asteroids congealed.

The volatile material ended up in the outer reaches of the solar system, eventually becoming incorporated into the giant gaseous planets like Jupiter and Saturn. By contrast, the inner planets – Mercury, Venus, Earth and Mars – are dense and rocky. The process by which they formed is not well understood, but it must have started with many small bodies sticking together and then gradually attracting other material by their gravitational pull.

Over time these inner proto-planets swept up the debris from the disk as they circled the Sun. For millions of years the hail of rocks and planetesimals (giant asteroids virtually the size of planets) onto the inner planets must have been horrendous, with objects hundreds of miles in size occasionally crashing down.

The scars of primeval bombardment remain clearly visible on the rugged faces of the Moon, Mercury and Mars, where the absence of a dense atmosphere has preserved very ancient craters. Although the rain of space debris abated as the rocks and asteroids were accumulated by the planets, it never entirely ceased. Many of the original asteroids survive to this day and are being discovered in increasing numbers.

The origin of comets remains mysterious. The accepted theory is that there lies an enormous cloud of them about a light year from the Sun. Each object is essentially a dirty snowball – a loose aggregation of rock, hydrocarbons and ice. Occasionally such a snowball gets displaced from the cloud and falls toward the Sun, where the volatile substances boil off, creating the distinctive tail. The comet then swings away into deep space again.

The gravitational fields of Jupiter and the other large outer planets sometimes deflect the comet and trap it in an elongated orbit around the Sun so that it returns periodically, like the famous Halley's comet. When this happens the stage is set for catastrophe, because there is a recurring chance that the captured object will collide with a planet, as in the case of Shoemaker-Levy.

Nobody is sure how comets get pushed out of the cloud. On its journey around the Milky Way, the Sun traverses the relatively crowded region of the galactic plane every 30 million years or so. Conceivably, passing stars agitate the cloud, creating episodic comet storms involving legions of disturbed comets hurtling sunwards to pepper the planets. If so, Earth could expect multiple impacts and mass extinctions of species roughly every 30 million years. In fact, the fossil record shows just such a pattern.

Another theory is that the Sun possesses a small companion star in a highly elongated orbit. Dubbed Nemesis, or the Death Star, this dim and as yet undetected body would spend most of its time at a vast distance. However, according to the theory, it periodically sweeps closer, plunging through the cloud and stirring up the comets, inevitably tipping some in our direction.

Some Star Wars engineers, formerly concerned about Russian nuclear attack, are now evaluating the threat from space instead and pondering ways to neutralize it using high technology. The obvious solution – zapping the approaching object with nuclear missiles – is too crude. It may simply break up but keep on coming, spreading its destructive power over a wider area. Panicky potshots would have to be resisted. The best bet is probably a controlled explosion of a nuclear bomb roughly 100 yards away from the object, causing evaporation of rock. As the gases streamed away they would create a rocket effect that would gently propel the object from a fatal onto a near-miss orbit.

While the research proceeds, should insurance companies be offering cosmic catastrophe policies? One estimate puts the likelihood of death by asteroid as higher than that from an airplane crash. This sounds scary, until you remember that a plane crash may kill at most a few hundred people, whereas an asteroid could kill millions or even billions in one hit. On a betting basis, the risk is a substantial one.

From crater statistics and astronomical observations, it is clear that there are many more small asteroids than large ones. This means the chances of a collision with Earth fall away sharply with explosive potential. For example, bodies under a mile in diameter probably hit Earth on average every 100,000 years, whereas objects of over six miles are unlikely to strike more than once every 50 million years. While a repeat of the Tunguska blast in our lifetime is certainly possible, the chances of a major impact of the sort that occurred when comet Shoemaker-Levy 9 plowed into Jupiter is infinitesimal.

Those who are still worried should perhaps take comfort from the experience of the dinosaurs. They lasted on Earth for 150 million years. Humanity has been around for a few million at most. Unless *homo sapiens* are particularly unlucky, we can expect to be around for a few more years yet. ☼

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dreaming of electric sheep

ALMOST 15 YEARS AFTER HIS DEATH, SCI-FI AUTHOR PHILIP K. DICK HAS RE-EMERGED AS THE PATRON SAINT OF PARANOIA AND UNCERTAINTY.

IT'S THE BASIC EXISTENTIAL NIGHTMARE. MIXING BECKETT AND *The Twilight Zone*, what if everything we take for reality is merely a stage set, an empty mirage or a projection of our own minds? Or worse, of someone else's? Where does the mind end and reality begin? And above all, where is God? For Philip K. Dick, grappling with these dilemmas became the obsession of a lifetime. In novel after novel, he set out variations on this theme: worlds decaying from entropy; worlds with strange time loops or in which time moves backwards; private hallucinations; shared hallucinations; and hallucinations within hallucinations; alternate realities; dual realities and fake realities; worlds in which clues from a higher order can be found in the minutest details. By the time of his death in 1982, he had left in his wake some 40 novels, the best of which are considered modern science-fiction classics. But even during his lifetime, Dick's work never fitted neatly into the SF ghetto. His questioning of identity and reality—which he summarized in two questions: "What is real?" and "What is human?"—are more the stuff of philosophy tomes than space adventures.



by George Melrod

Illustration by Gregory Baldwin

in novel at
worlds dec



Original photograph: Nicole Panter

ter novel, he set out variations on this theme
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enshrinement in the literary pantheon is far from complete: while few question the fertility of Dick's imagination, questions about his ideas, his prose and even his sanity persist, fueled by awareness of his drug use and personal instability, and the fervor with which he articulated his idiosyncratic visions. Still, for all his flaws, Dick remains a fascinating and compelling figure who blended an astounding and rigorous imagination with an abiding compassion for the human condition and is well deserving of the term 'visionary.' As Sutin muses, "Dick addressed issues we all wonder about, only he wondered harder and imagined deeper than most of us."

Further burnishing Dick's reputation is the successful translation of his works into film. *Blade Runner*, from 1982, is still widely considered a classic of the genre, and its promise was echoed by the box office hit *Total Recall* in 1991 (although Dick's enunciation of dual realities was largely eclipsed by violent killings and the brawny heroism of Arnold Schwarzenegger).

BORN IN CHICAGO, DICK GREW UP IN CALIFORNIA, RAISED MAINLY by his mother; their relationship remained contentious for most of his life. His youth was defined mainly by his passion for music, cats and science fiction as manifested in his collection of pulp magazines. Sutin's biography chronicles Dick's forays into writing, his aspirations for mainstream acceptance, his struggles and successes as a sci-fi author, as well as his abundant infatuations and wives (he had five), his personal charm, indigence and frequent drug use (mainly with pills, some prescribed, many not).

A turning point, perhaps *the* turning point of Dick's life, occurred in February/March of 1974 (referred to by Dick simply as 2-3-74) in which his emotional crises, drug use and fervent fascination with religion, came together in a series of mystical visions during which, he believed, God revealed himself. Later on, Dick would interpret the event partly as *anamnesis*, which means a loss of forgetting, an unveiling of previously hidden memories of past lives or realities. Although Sutin refrains from judgment, Dick himself was well aware of how he would be dismissed: "'He's crazy' will be the response. Took drugs, saw God. BFD (big fucking deal)."

However, the experience profoundly changed Dick, and the religious themes which were latent in his earlier novels emerged in his later writings. These works included his 1981 novel *Valis* and its two sequels, and his private journal, *Exegesis* (which has been posthumously published, also edited by Sutin), in which he mapped out his various philosophical-religious speculations.

Eschatology aside, one of Dick's other signature themes is the motif of schizophrenia, or binary realities, which seems to have been catalyzed by his enduring grief over the death of a twin sister named Jane, who died shortly after their birth in 1928. Dick himself died of a massive stroke in 1982 at the age of just 53; in a final, redemptive irony, he was buried beside his infant sister.

Says Edward Kastenmeier, an associate editor at Vintage: "Our perception was, his time had come. He was dealing with issues in ways other authors weren't; his fears about technology and human identity seemed more timely than ever.... He never really broke beyond the science fiction genre during his lifetime; he never really made it into the mainstream. I think he has now."

Because acceptance was so elusive in Dick's personal life, and came so sporadically in his professional life, there's no doubt he would have cherished the acknowledgement. In fact, his



THE WORKS THAT SURVIVE DICK ATTEST to the disorienting intensity of his vision. Reading one of his books is like stepping into an M.C. Escher print: he's constantly pulling the ground out from beneath your feet then showing you it was really the ceiling. *Time Out Of Joint* (1959), one of Dick's early novels, sets up his basic, paranoid premise: a protagonist living in a genial 1950s-type town finds objects fading out of existence and gradually realizes that he has suffered a nervous breakdown and is living in a delusional world, devised by military observers, in 1998. *The Man in the High Castle* (1962), which won the Hugo Award in 1963, takes place in an alternate present in which the Allies lost World War 2 and the U.S.A. has been split up between the Nazis and the Japanese, with a Rocky Mountain buffer state in between. Simple enough. However, also existing in this world is a cult novel depicting a fictional world in which the Allies won WW2: an alternate reality which, one character comes to realize, exists alongside theirs on a parallel plane. This concept of nested paradoxes is echoed brilliantly in many of Dick's later novels. In *The Three Stigmata of Palmer Eldritch* (1965), the protagonist Eldritch, an evil industrialist, returns from another galaxy with a drug which allows the user to live out his fantasies. However, the reality is so convincing one doesn't know when the fantasy stops and reality begins; worse, these fantasies are controlled not just by the user, but by Eldritch himself and the alien beings controlling him. In *Ubik* (1969), a group of "precogs" – humans with unusual psychic powers – survive an ambush on the moon, only to find their shared reality decaying before their eyes: cigarettes crumble in their hands as if decades old, their rocket ship reverts into a Boeing jet, and then to an early bi-plane. Gradually, it becomes apparent that these survivors are in fact being held in near-death in a stasis called half-life, while their boss, who they thought dead, is sending them clues from the real world. In *Flow My Tears, The Policeman Said* (1974), a famous media figure living in a police state wakes up in a world in which nobody knows who he is. In *A Scanner Darkly* (1977), Dick's hilarious, rueful homage to his friends lost to drugs, a drug agent posing as a druggie is assigned to narc on himself, as his mind gradually splits into two and disintegrates.

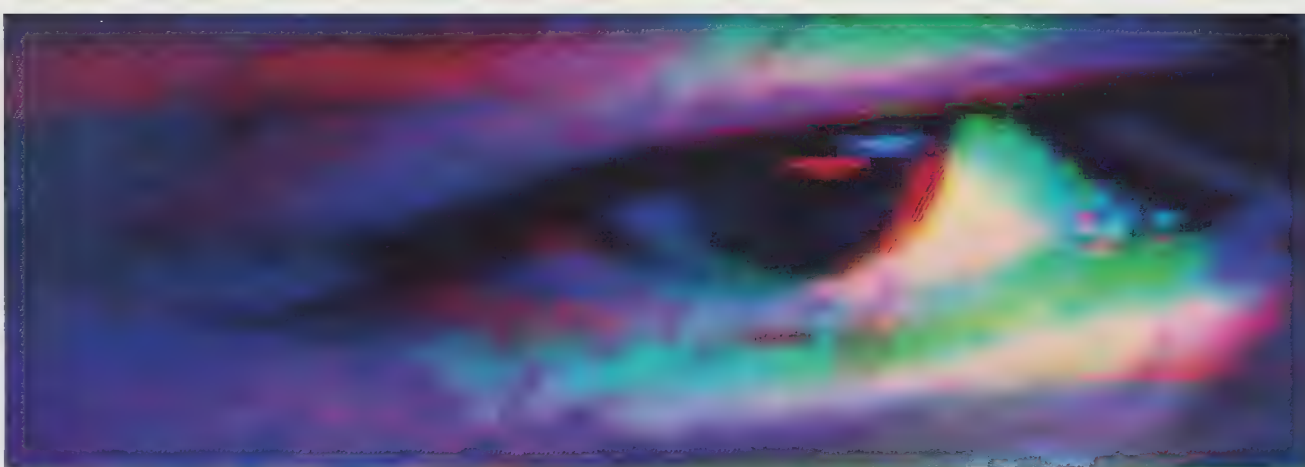
Valis (1981) is the first volume in his so-called "Valis Trilogy," which contains Dick's most explicit articulation of his theological inquiries. The name is an acronym for Vast Active Living Intelligence System – in other words, God. Building toward a search for hidden clues from Valis, the story includes among its cast two distinct alter egos for the author: a victim of a nervous breakdown named Horselover Fat and a narrator named... Phil Dick.

As incohesive as Dick's worlds are in themselves, arrayed on a bookshelf they make a surprisingly coherent body of work. In their outlandish plots and eager use of sci-fi lingo, including peculiar aliens with weird names, they obviously build on Dick's extensive knowledge of the SF genre. But if his "irreal" worlds were conceived in *Amazing Stories*, they were incubated amid serious

metaphysical inquiry. Though he dropped out of Berkeley after one semester (he later said he was thrown out for refusing ROTC), Dick was an enthusiastic reader. He was acquainted with Hume and Kant, and was well aware that the issues he raised in his novels regarding the fallibility of subjective perception and the unknowability of reality addressed their basic philosophical conundrums. In an effort to grapple with his own self-diagnosed psychoses, he became familiar with clinical psychology and the work of Carl Jung. He read American fiction; he admired James Joyce. As his own writing became more informed by spiritual inquiry, his broad spectrum of study included Greek philosophy, the Bible, the cabbala, Gnosticism, Christianity, Zoroastrianism, Zen Buddhism, Hinduism, Sufism and the I Ching.

Intriguingly, Dick knew his own weaknesses. In one 1966 essay he writes: "Religion ought never to show up in SF except from a sociological standpoint.... God *per se*, as a character, ruins a good SF story; and this is as true of my own stuff as anyone else's." (Though later he adds, "I have written and sold 23 novels, and all are terrible but one. But I don't know which one.") And in a 1969 interview, asked to name "the greatest weakness of science fiction today," he replies: "Its inability to explore the subtle, intricate relationships that exist between the sexes." Since Dick's fascination with religious allegory had such a significant impact on his work, it would be ludicrous to fault him for violating his own dictum. However, since his women characters often range between dark-haired objects of sexual attraction and oppressive vixens based on his ex-wives, it could be argued that Dick never quite mastered the issue of gender relationships.

Another perceived transgression within Dick's work derives from its plebeian, Californian mass-cultural vernacular, which does not exude the perfume of sophistication expected of high literature. Sutin adroitly argues that this very colloquialism empowers Dick's work, couching his unlikely ideas in a readily accessible everyday language. It's true, Dick sometimes gushes (he could type 100 wpm), and his books are wildly uneven. His plots often digress in weird arcs. But he satirizes brilliantly, dissecting consumerist culture with incisive wit and a zealous, vivid prose style (his implicit skewering of capitalism made him a darling of Marxist critics). In his own way, he is also a keen observer of suburban lifestyles and frustrations, sort of like a Southern Californian Updike on acid, unearthing disarming snippets of fractured reality, specializing in oddly revealing details, or characters ruminating to themselves in moments of bewilderment or despair



Worlds with strange time loops' or in which time

alternate realities, dual realities and fake realities; worlds in which clues from a higher order can be found in the minutest details.

Yet even more than his humor, it is Dick's compassion for his characters in the face of these terrifying uncertainties that remains his most appealing trait. Whatever inspired his paranoia, it bred in him a genuine love of freedom and a distrust of mechanisms of social control. He was always rooting for the little guy. As he wrote about himself in one 1973 blurb, "Most of all, he tries to express in his novels the fight against oppression of the free human spirit, of whatever kind: any tyranny, such as drug addiction, a police state, or manipulative psychological techniques. The ordinary citizen, without political or economic power, is the hero of all his novels, and is his hero, too, his hope for the future." Dick rephrased this idea in a 1978 essay, "How to Build a Universe": "So I ask in my writing, What is real? Because unceasingly we are bombarded with pseudo-realities manufactured by very sophisticated people using very sophisticated electronic mechanisms. I do not distrust their motives; I distrust their power." By the same stroke that he was constructing his oppressive worlds and elusive irrealties, he was also implicitly deconstructing the real-life mechanisms of authority he saw around him.

"What is human?", Dick's second pivotal theme, questions the difference between being a set of mere mechanical reflexes and a human being. Freedom is part of the answer, but so is empathy. His first published SF story, from 1952, centered on a "wub," a slobbering Martian creature that looked like a pig – but whose enlightened soul made him more human than the humans. A contrary example is represented by the androids in *Do Androids Dream of Electric Sheep* (1968), the novel which was adapted into *Blade Runner*. However, in Dick's world it was always possible for the android to be more human than the human, and vice versa, as in his novel *We Can Build You* (1962/1969), which features a robotic simulacrum of Abraham Lincoln who feels real anguish, in contrast to some of the flesh and blood characters who constructed him. In his "Introduction to *The Golden Man*," a 1980 essay, Dick writes: "The SF writer sees not just possibilities, but *wild* possibilities. It's not just 'What if ... ?' It's 'My God; *what if...*' In frenzy and hysteria. The Martians are always coming."

What may be most ironic about Dick is that, over time, he came to believe in these possibilities as viable models of reality. As he wrote later, "All I know today that I didn't know when I wrote *Ubik* is that *Ubik* isn't fiction." One of his most fascinating theories is that God is a sort of celestial programmer who exists outside time and who is constantly improving his creation by changing events – including past events – so that we are living in an ever-improving present, carrying with us shadow memories of past presents that had once existed. Another hypothesis he considered was that an early Christian named "Thomas," from A.D. 70, was speaking to and living through him. *Shifting Realities* delineates these theories and others, in Dick's own words, through his autobiographical writings, speeches, essays and excerpts from his *Exegesis*. (A special treat is the inclusion of two chapters from his unfinished sequel to *The Man in the High Castle*.) It is a compelling presentation.

One can only imagine how the delegates of the science fiction conference at Metz, France, in 1977, reacted when Dick averred that he actually retained memories of an alternate United States in 1974, one in which Nixon was not forced to resign and a tyranny ruled the United States. But audience skepticism is allayed, at least in part, by Dick's own bemused self-doubt and admissions that he must probably seem like a lunatic. "One thing I really want you to know," he adds in his Metz speech. "I am aware that the claims I am making... can neither be proved nor can they even be made to sound rational in the usual sense of the word." One senses that Dick's goal was never so much to convince others, but rather to explain his experiences to *himself*, opening himself up to the widest range of possibilities. But that was nothing new: building universes was his business.

Sutin astutely acknowledges Dick's singularity, likening him to the early Greek scientist-philosophers, who built their own theoretical cosmic world-views. Yet even if one's awe at Dick's dazzling theories and systematic rigor is offset by their author's hunger to believe in them, they are wildly thought-provoking. Especially later in life, Dick always seemed to eschew easy explanations for elaborate cosmic formulations, until eventually he was looking for clues from God in the trash in the gutter. Which is another of Dick's remarkable paradoxes: he started out seeing entropy lurking behind every manifestation of reality, and ended up seeing divine order behind the most random incidents of entropy.

While *Shifting Realities* gives exceptional insight into Dick's conceptual subtexts, Sutin's biography is especially useful as an index to his fiction. Candid, non-judgmental and aptly effervescent, it puts Dick's works into the context of his tumultuous life, and even provides a complete chronology of his novels, with a 1 to 10 'quality ranking.' The next step in the Dick canonization, perhaps, would be a book of essays *about* Dick, written by other SF authors, philosophers, comparative religion scholars, physicists and such. Until then, Sutin's works make a compelling case for Dick's singularity as a visionary writer and thinker, while the reissuing of his books helps ensure that his voice will be available for future generations.

Was Phil Dick off his rocker? Who's to judge? Through the visceral immediacy of his frenetic worlds, he has emerged as a patron saint of doubters, seekers and visionaries, an icon of 20th-century technological dread and existential yearning. To Lawrence Sutin, however, Dick's elevation to cult status does injustice to his legacy. "I get uncomfortable when people try to peg him as some second-rate prophet," he admits. "To me, the association of Dick with a cult doesn't make sense.... One point many critics of Dick miss is that Dick was never trying to provide answers. He did believe one could find them, but much to his credit, he never embraced a single belief or tried to convince the reader. I think the challenge of Dick's work is to embrace his indeterminacy."

In fact, the same confounding open-endedness that defines Dick's vision still leaves many critics and readers uneasy. "Dick still isn't quite respectable yet," Sutin reflects. "Maybe that's for the best." ■



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HP=MC²

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In a business environment where most rivals share similar technologies, nobody gets light years ahead of the competition. Success is hard-won and long remembered. Hewlett-Packard made the first desktop scientific calculator. That was eons ago – in 1968. The company was a pioneer in the days when PC might have stood for 'pocket calculator'. HP made the first pocket calculator in 1972.

Today, HP ranks first in minicomputers and laser printers, second in workstations, and first in a range of scientific measurement and medical instruments. Personal computers are the company's fastest-growing activity. In 1993, sales of HP products rose by almost a quarter to \$US20.3 billion. That's a lot of success and a lot of execution.

In the future, the company will be applying its MC² strategy to a new objective: merging its skills and experience into technologies to serve a multimedia age.

This is already happening. Earlier this year, Hewlett-Packard won a contract to supply computers for an interactive television system in the United States. The computers will store the movies and catalogues ordered by the system's subscribers.

Doctors in California are currently testing HP's prototype of a 'physician's workstation' – an MC² device if there ever was. The workstation collects medical data from a network of hospital computers that variously contain information such as patient histories and pathology results, and assembles them for assessment on one computer screen.

The company is also working on software systems to make computers easy to use and program.

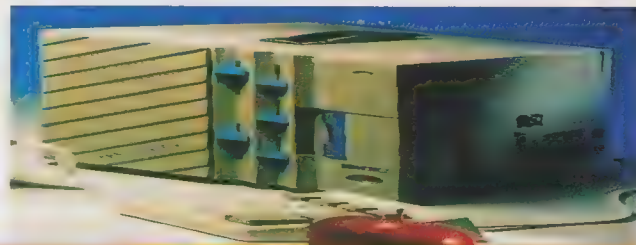
Further afield, HP hopes to produce a hand-held computer that also operates as a mobile phone, fax machine and electronic mail box. The machine will provide a wireless link to a computerised database or the printer at your office.

Few other companies have the established skills and experience to produce such multimedia devices. As the worlds of measurement, computers and communications come together, Hewlett-Packard hopes to make a unique contribution to IT that the others will find hard to beat.

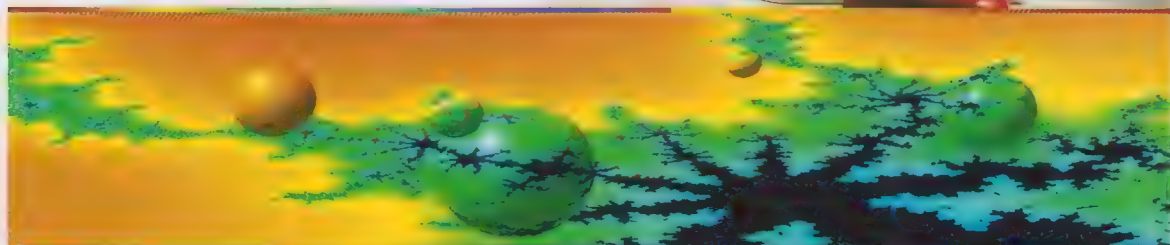


scan

*design: empowering
the disabled*



*visions: scientists
speculate on the future*



*astronomy: scientists launch
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AS THE DISABLED POPULATION INCREASES — BY OVER ONE MILLION PER YEAR IN THE U.S. ALONE — COMPANIES ARE DEVELOPING TECHNOLOGIES ALLOWING THIS BURGEONING “MARKET” TO LEAD MORE PRODUCTIVE LIVES.

BY ADAM L. PENENBERG

When Don Dalton talks, people — and machines — listen. Dalton runs his million-dollar-plus business, Micro Overflow Corp. of Naperville, Illinois, by voice and voice alone. By speaking into a specially designed dictaphone, he controls all the functions on his computer and runs his company's day-to-day operations — scheduling, overseeing finances, even typing (at 100 words per minute).

But Dalton is not your typically hardened CEO on a quest for more holy dollars. He's a man on a different mission, one for which he is uniquely suited. He's a quadriplegic, paralyzed from the chest down and confined to a wheelchair, and, as he says, he deals in miracles: adapting available computer technology for people with disabilities so they can lead productive lives.

Although people with disabilities, like Dalton, stand to gain the most from computers, it's only recently that technology has advanced to the point where the lines separating disabled workers from the rest of the population have blurred. Indeed, Dalton's company is already tapping into an explosive market, which, today in the U.S. alone, is made up of 43 million potential consumers — the number of Americans with disabilities ranging from blindness to carpal tunnel syndrome to learning disabilities to paralysis. That's roughly 20 per cent of the population. And with advances in medicine keeping more people alive than ever before, Dalton estimates that by the year 2005 the number of disabled Americans will equal the number of non-disabled Americans.

With the number of Americans with disabilities growing at more than a million a year, and America's health care system already wanting, an appropriate rallying cry for the movement might be: “If we do not overcome, we shall overwhelm.”

“I want to level the playing field for people with disabilities, and the best way to do that is with technology,” Dalton says. “Disabled people want to work more than anyone, so if you're an employer and I'm a quadriplegic, and I can't type 100 words a minute but I can talk it, we erase the disability.”

“People talk about markets, but this one is huge.” On the market today are dictaphones that type and spell-check, scanners that are combined with voice

synthesizers which can store and read back text, technologies that enable users to control computers with literally the blink of an eye, and talking maps that not only tell blind users how to get somewhere, but also guide them there.

One of the most popular technologies for disabled computer users is the DragonDictate, manufactured by Dragon Systems of Newton, Massachusetts. DragonDictate, with a backup dictionary, can recognize up to 100,000 words and can even be customized for professions steeped in esoteric jargon.

It works by identifying the phonemes and subphonemic acoustic elements — the sounds that are the building blocks of speech — and grouping them into words, then comparing them against already stored word models. Each time a user says a word, a box appears on screen with a list of words the program thinks were said, ranked in order of probability, the first choice displayed as text. If the desired word or phrase is listed below, the user can simply select it verbally, or with a mouse or keystroke. The technology adapts to the style of each user, growing more in synch with the user over time, guessing with greater accuracy.

DragonDictate is also becoming popular with non-disabled workers who are called on to type massive documents, such as stenographers and medical transcribers. In just a few weeks, users can “type” as quickly as they talk, in many cases more than 350 words per minute.

For those bereft of the gift of gab, there is an interesting device in development for those suffering from speech disorders, impaired motor coordination, repetitive stress injuries, carpal tunnel syndrome and paralysis, called “eye-track,” invented by Dr Arie Kaufman, a professor of computer science at the University of New York at Stony Brook.

Although several computer interface systems have been devised for people who can't type or speak, they are prohibitively expensive or intrusive. For example, Eyegaze, developed by LC Technologies of Fairfax, Virginia, relies on a video camera to shoot 30 pictures per second of the user's eyeball. On screen is a picture

of a keyboard, which the user accesses by looking at a specific key for more than a quarter of a second. Even a person with severe limitations — for example, someone who can only move one eye — can use a computer with Eyegaze. But it sells for US\$19,000, well beyond most people's ability to pay.

Kaufman claims his invention is significantly cheaper, simpler and, although perhaps less accurate, equally effective. By placing electrodes near the eyes, Kaufman, who holds several patents, says he can tap the energy released into the field at the front of the head as the eyeballs rotate. The voltage shifts are amplified and used to drive a plotting device attached to a computer. Based on electro-oculography, Kaufman's invention even enables users to program the system: a right blink followed immediately by a left blink could be a page-down command, for example. Users could even operate a wheelchair.

“There are still some problems that must be overcome, related to head and muscle movement, signal drift and channel crosstalk, but we can work these out,” says Kaufman, who is known primarily for his work in volume visualization, a technology that makes it possible not only to see the surfaces of objects, but also inside them. “I'm sure the greatest advancements in science in the coming years are going to be in the field of computer science.”

Not yet on the market, eye-track was supported by grants from the National Science Foundation and New York State Science and Technology Foundation.

For those who can't see, Arkenstone, a not-for-profit organization based in Sunnyvale, California, has special maps. *Atlas Speaks* is a talking map for a PC or laptop that helps users learn about the physical layout of a state, city, or even

neighborhood — cross streets, landmarks, points of local interest. The information can either be printed in braille or plugged into a talking notebook computer — called “Strider.” Relying on existing satellites, Strider can direct users on a path plotted ahead of time, help determine other courses, or simply keep users informed of their current locations.



Arkenstone also combines other technologies to produce reading machines, a market Jim Fruchterman, president of the company, estimates will exceed US\$100 million this year. By combining a PC, a scanner, a reading machine that records, translates and saves scanned words into text, a keyboard, and a voice synthesizer, any book can be accessed at any time.

"We get co-operation, like from the defense department, for example, and then we bring it to market," Fruchterman says. "We get lots of hi-tech companies like Hewlett Packard, Intel, Panasonic and ETAK, the digital map providers, to either donate products, expertise and hi-tech support, or just give us good prices.

"We try to run Arkenstone like a hi-tech company: Earn a living and enjoy what we're doing."

On the horizon are new medical technologies that don't stop at leveling the playing field at work. They attempt to get the root of the disability. Researchers at MIT and Massachusetts Eye and Ear Infirmary in Boston are developing microchips that could be implanted into the retina to restore the gift of sight.

A light-sensitive microchip would serve the same purpose as the retina's "photoreceptor" cells. Normally, these cells translate light waves into electrical impulses, then transmit them to the brain. If successful, this would be a relief to the millions of sufferers of macular degeneration and retinitis pigmentosa, the two leading causes of blindness.

Microchips are also being enlisted to treat hearing loss, and some have been conscripted by doctors to assist paraplegics in walking. Thanks to electroejaculation techniques, some men with spinal cord injuries have even fathered children.

But for the here and now, there are companies like Dalton's Micro Overflow and Fruchterman's Arkenstone.

"I enjoy showing people that, as a person with a disability, if I can overcome it, then so can you," Dalton says. "If the technology is there to level the playing field, then I'll be there."

While necessity may be the mother of invention, new technologies, by meeting the needs of the disabled, are fast becoming the midwife of invention. ■



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TO ORDER, FILL OUT THE COUPON IN THIS ISSUE.

science function

BY ROBYN WILLIAMS

The world's leading scientists are generally reluctant to forecast the likely breakthroughs of the next century. But if the question is asked by the journal *Science*, where many scientists hope to have their papers published, the response includes some fascinating predictions.

Michael Ashburner of Cambridge expects the complete gene sequences of at least five multicellular creatures to be known by the year 2000. As the process of sequencing DNA components increases, he expects "a complete database of all living organisms" and their characteristics – an astounding claim, given that today only one-and-a-half-million species have names, but 30 million are thought to exist.

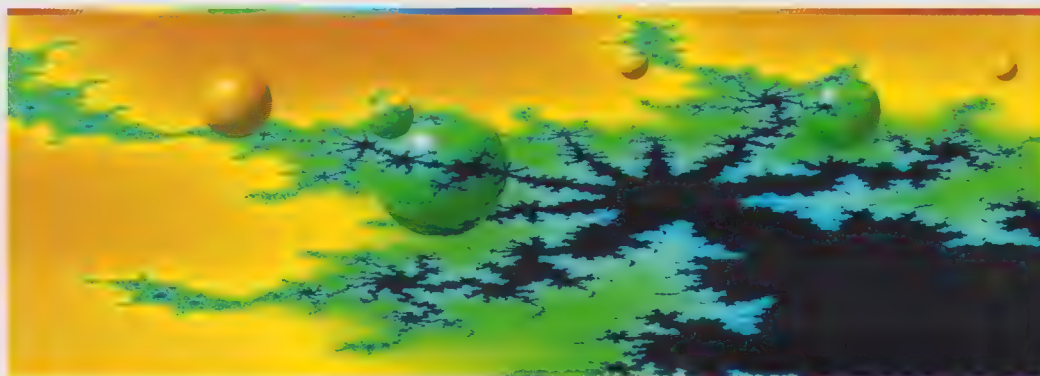
Ashburner's colleague Peter Goodfellow believes that "by the end of the decade, all the genes contributing to genetically complex diseases will be known." He foresees screening for conditions including diabetes, schizophrenia and obesity, with genetic therapy to treat potential sufferers.

Goodfellow points out that such screening will be voluntary, but expensive. "For societies with private health-care systems, the rich will become healthier and the poor sicker. In both systems, balancing the rights of individuals against the needs of society is going to be difficult."

At New York's Sloane-Kettering Cancer Center, Paul Marks foresees another gene revolution. "We are in the midst of a productive search for genes that place an individual at increased risk for cancer," he says. "Over the next few years, for every major cancer – breast, prostate, colon, lung and ovarian – a gene or genes will be identified whose presence increases the risk for cancer. These discoveries are providing the basis for diagnostic tests in the presymptomatic stage of cancers," thus allowing their probable prevention.

At the Whitehead Institute for Biomedical Research in Massachusetts, Harvey Lodish sees human DNA information fed into supercomputers, together with the mother's medical history, so that the fetus can be 'screened' and its health monitored.

"The output will be a color movie in which the embryo develops into a fetus, is born, and then develops into an adult, explicitly depicting body size and shape,



hair, skin and eye color. Eventually the DNA sequence base will be expanded to cover genes important for their traits such as speech and musical ability; the mother will be able to hear the embryo – as an adult – speak or sing."

You will know your baby-in-the-womb as a walking, talking, crooning grownup before it is even born – there will be no surprises.

The body will also experience new effects from the new use of drugs: a constant high frontier, but for different reasons from those we enjoyed at the start of the century. Then, the search was for magic bullets, a promise Louis Pasteur had made seem inevitable as a succession of miracle medicines were found. By the 1950s there was even talk of infectious disease rapidly becoming a casualty of history, of the powers of modern science. But, according to Helen Ranney of Alliance Pharmaceuticals, San Diego, the "rapid emergence of drug-resistant microbial agents will lead to renewed searches for antibiotics. Common antibiotics were identified by screening natural products – for example soils and moulds. Renewed searches of other natural products will identify one or more new classes of agents with new modes of action."

Ranney sees much progress in the understanding of what causes diseases such as Alzheimer's, schizophrenia and manic depression, but does not expect treatment to be effective before 2015, unless Goodfellow's gene-therapy approach becomes available.

Rita Colwell, the new president of the American Association for the Advancement of Science, who is based in Maryland, expects the sea to be a prime source of such natural products. "The marine environment has only recently been explored as a source of new drugs." She cites those holding promise for the treatment of melanoma, ovarian cancer and leukemia.

But Philippa Marrack of the Howard Hughes Medical Institute in Colorado looks forward to important vaccines such as one for malaria. With a caveat: "This will be a slow and difficult development because no government or company will want to pay for the process."

Why not? It's complicated but involves more-effective carriers for the antigens, including AIDS virus material. She is hopeful on another front though: the likely elimination of rheumatoid arthritis. "Scientists will discover that a single peptide from a protein found in human joints is the target of the autoreactive T-cells that initiate rheumatoid arthritis in more than half the cases of the disease. Clinical trials in which the peptide is given in various forms to prevent the disease will be started in the year 2005 and ended in 2050 for lack of patient enrolment."

That's the kind of in-your-face prediction I like. Pity the timeline is such as to have too many of us still hobbling.

Cambridge's Peter Goodfellow sees a completely different approach to disease prevention. We shall invite germs to infect us, the geneticist says:

"In a world beyond our imaginings, children going to school for the first time will, like now, return with sore

The body will experience new effects from the new use of drugs.

An entirely new way of fabricating multibillion transistor circuits will be devised.

All the genes contributing to genetically complex diseases will be known.

Single-molecule detection of chemicals will be almost possible.

throats, running noses, muscle pains and headaches. They will be left to suffer. A viral infection is the best way to train the immune system. Adults, however, will have the option of taking a cup of tea, an infusion of the moss *Sphagnum antivirans*. This moss, discovered just before the felling of the last stand of the world's rainforests, is a potent source of small molecules that block viral adhesion to epithelial [lining] cells. The only side effect of this natural drug is that it produces a mild euphoria. The rainforests of the world will have been saved, in order to provide sufficient quantities of tea for those fed up with the autumnal ritual of suffering brought on by the new school year."

Marrack offers a similar prediction: "The American public will be told by the popular press that bacterial products help the immune response to infections such as the common cold. Consequently, health clubs will set up programs to put 'muscle into lymphocytes,' in which yuppie individuals in leotards swallow capsules containing Gram-positive bacterial cell walls mixed with bee pollen."

Nanotechnology, the engineering of the unbelievably small, will come into its own. Robots the size of blood corpuscles will be made. Some will patrol your insides to keep everything under repair.

William F. Brinkman is similarly excited about "a revolution occurring in telecommunications" which will allow "transmission of a terabit per second over a single fiber."

As for the chestnut that we are but a passing stage in evolution before the computers take over, Nobel Prize-winning physicist Philip Anderson of Princeton offers this astringent assessment: "Anyone who expects any human-like intelligence from a machine in the next 50 years is doomed to disappointment."

Anderson is a gravel-voiced skeptic who shares Noam Chomsky's disdain for the cavalier assertions made by the likes of Marvin Minsky from MIT. Minsky has said that "the next stage of evolution, after carbon, is silicon." Even our emotions will be computable, says Minsky, and very fast computers will be able to absorb the whole of human culture, from Beethoven to Buddha, in seconds. Now the backlash is truly on, if Anderson is right.

Another kind of conductivity, this time in nerves, will offer a remarkable breakthrough, according to Richard N. Zare of Stanford University. He looks forward to the time, soon enough, when single-molecule detection of chemicals will be almost possible. This could well signal a solution to the big one: how our brains work. Zare puts it like this: "These instrumentation breakthroughs put us on the threshold of understanding many of the remaining mysteries of life, such as the chemical basis of learning and the conditioned response."

The 'rewiring' of damaged nerves, even within the brain, is a real possibility. Experiments in this field have been slow but promising. Dennis W. Choi of Washington University sees the potential: "Approaches to replacing lost tissue with transplanted cells derived from fetal brains, or cell lines transfected with useful genes, also have considerable momentum in the animal laboratory." It's already been done in Sweden.

The race to improve the human body by the end of the millennium is assuredly on, but, in the challenge to find the ultimate energy source, similar miracles seem more in dispute.

The shooting star of the late 1980s – Superconductivity – which promised energy far more cheaply and quickly than ever before, never seemed to happen. Physicists are still at a loss to explain how it all works. Some, such as Anderson, can't really understand all the fuss. "We will, in 20 years, wonder why we cared so much. It is not clear why or whether a room-temperature superconductor would be more useful for most purposes (although it could be a godsend for biological instrumentation). For most uses, advances in cryogenics will make minus 200 degrees so easy to manage that little flexibility will be lost"

The real major use of superconductivity will turn out to be something we haven't yet thought of.

Anderson is a maverick. He was one of the loudest voices in President Clinton's ear arguing against the building of the billion-dollar Superconductor Supercollider outside Dallas, Texas. But he states, "The real major use of superconductivity will turn out to be something we haven't yet thought of."

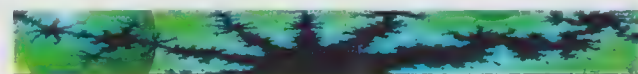
Dr T.M. Rice of AT&T Bell Labs is also skeptical, but Theodore H. Geballe of Stanford is far more positive: "Major benefits for medicine, telecommunications and electrical power systems will be realized in the *near future* [my italics] based on the high-temperature superconductors." Geballe resurrects the old dream that "coaxial superconducting underground power transmission cables, which offer high capacity, no visual pollution, and are relatively inexpensive, will be used to bring more electrical power into our cities."

What about the field of electronics? Who better to ask than Arno Penzias? Also from AT&T Bell Labs, Penzias won the Nobel Prize for physics for his discovery of background noise in the universe – the echo of the Big Bang.

"Much of today's economic progress," says Penzias, "hinges upon the continued increase in cost and performance of silicon integrated circuits, made available by steady improvements in lithography over the past quarter-century. While we still have some way to go, the end seems in sight. As line widths shrink toward 0.1 micrometers and factory costs zoom past one billion dollars a piece, little more improvement in conventional lithographic technology seems likely. Hopefully, an entirely new way of fabricating multibillion transistor circuits will be devised. One atom at a time seems a bit tedious, but who knows how fast microfabrication techniques might work?"

If scientists are making such predictions for the future, one wonders what is left for science fiction. ■

Anyone who expects any human-like intelligence from a machine in the next 50 years is doomed to disappointment.



TWO YEARS AFTER THE STAR WARS PROGRAM COLLAPSED, A TEAM OF SCIENTISTS HOPE TO USE THE COLD WAR TECHNOLOGY TO WATCH STAR BIRTHS WHICH OCCURRED ONE BILLION YEARS AFTER THE BIG BANG.

intergalactic zeppelin

BY IAN ANDERSON

A team of astrophysicists from the U.S. and Australia has come up with the radical idea of using Reagan-era Star Wars technology to provide unprecedented views of the formation of galaxies. Costing far less than any telescope orbiting in space, the proposal calls for a 4.37 yard telescope to be hitched to the bottom of a blimp suspended 7.45 miles above the South Pole.

"All the technology exists," says Michael Dopita from the Mount Stromlo Observatory at the Australian National University in Canberra. "It's just a matter of stringing it together."

Dopita and his colleagues – Holland Ford from Johns Hopkins University, John Bally from the University of Colorado at Boulder, and Pierre Bely from the Space Telescope Science Institute in Baltimore – want to make use of a telescope that is being offered for sale for US\$25 million by Itek Optical Systems in Massachusetts. Their proposal to refurbish the telescope for infrared astronomy, called the Polar Stratospheric Telescope or POST, will be published later this year.

Under a Stars Wars contract, Itek built a telescope that Dopita believes was designed to be part of a laser system to fire at missiles in their boost phase. "We know its specifications and we know that its optics were successfully tested in a vacuum chamber," said Dopita, "but precisely what it was to have been used for has not been declassified." The idea is to fly the telescope about 328 yards below a zeppelin-shaped blimp that is tethered by cable to the ground. The blimp the researchers have in mind would be a slightly larger version of helium-filled blimps made by a company called TCOM, a subsidiary of Westinghouse. "They have made blimps of up to 83 yards in length for police surveillance work and for military use," said Dopita. "We need one that is 98 yards long." The cost would also be about US\$25 million.

The extra length is needed so that the blimp has enough volume to reach an altitude of 7.5 miles. At this height over Antarctica, it would reach well into the stratosphere, an ideal location to detect light in infrared wavelengths. Water vapor, which would absorb infrared emissions, is virtually non-existent. The ambient temperature of about minus 90 degrees Celsius

prevents heat radiated from instruments spoiling the sensitivity of the telescope and, because of a low atmospheric pressure, the air is extremely calm.

The blimp will take about 80 minutes to reach the desired height. "It works much like the bladder of a fish," said Dopita. The blimp contains an air-filled sack or bladder called a ballonnet. As it rises, the helium expands to force air from the ballonnet into the atmosphere via automatic valves. "The blimp remains buoyant and there is constant tension on the cable," said Dopita. On return to Earth, air is pumped back into the ballonnet. The tether, made of layered Kevlar, will carry power and a fiber-optic data link between the telescope and a ground station.

The telescope, weighing only 2.5 tons, will be lifted inside a pouch on the bottom of the blimp. When winched on a cable about 328 yards below the blimp, it will be able to see at least 90 per cent of the sky (the blimp will shield the rest). A gyroscope will be used to move the telescope on both a horizontal and vertical axis. "The gyro stabilization will compensate for any swaying of the payload," said Dopita. At the South Pole, as the stars don't set over an horizon, the telescope will be able to track them constantly.

The telescope itself has a so-called fast-steering mirror which means that it too can correct for any

wobbles. The 4.37 yard primary mirror is made of a graphite epoxy film that is only 0.67 in thick. About 400 actuators or pistons behind the mirror will continually adjust the surface to keep it stiff. The light it collects will be deflected to a secondary mirror, back to an imaging mirror and on to the fast steering mirror. This mirror, which can be continually adjusted, will focus the light onto a detector behind the main mirror.

Given the viewing conditions at 7.5 miles, the telescope will be ideally suited to gather emissions in the near infrared wavelengths, especially between 2.2 and 2.6 microns. "This will allow us to look at hydrogen alpha emissions when galaxies were forming about a billion years after the Big Bang," said Dopita. "Between 2 and 10 microns, POST will be much more sensitive than the Hubble Space Telescope which operates in much warmer ambient temperatures."

The team wants to test the observatory at a rocket range operated by the University of Alaska at Poker Flat near Fairbanks. By 2003 it hopes POST will be operating above Antarctica from March to September when the region is in darkness. "We expect to achieve 3,000 hours of observing time during the period," Dopita said.

Several sites are being investigated in Antarctica but two closest to the geomagnetic South Pole, Dome Circe and the Russian base at Vostok, would mean that the telescope would not be affected by the glow from aurora australis, the collision of molecules with electrically charged particles in the upper atmosphere. The structure of the Earth's magnetic field means that the glow disappears at the magnetic pole.

The cost of the project, including the telescope, the blimp and a ground station, would be about US\$100 million. This is about one-fortieth the cost of the HST and about one-fifth the cost of a space shuttle launch or an orbiting telescope such as the Cosmic Background Explorer. "Given that the telescope could be used for at least 10 years, we believe it is a highly cost efficient project," Dopita said. ■

HUMBLE TELESCOPE: Operating in cooler temperatures the balloon-based POST is more sensitive than the Hubble Space Telescope.



flame jamming

Flame Wars: The Discourse of Cyberculture

EDITED BY MARK DERY

DUKE UNIVERSITY PRESS 1994

REVIEWED BY DARREN TOFTS

Culture Jamming: Hacking, Slashing and Sniping in the Empire of Signs

BY MARK DERY

OPEN MAGAZINE PAMPHLET
SERIES (#25)

OPEN MEDIA 1993

REVIEWED BY DARREN TOFTS

In *Mondo 2000's User's Guide to the New Edge*, Mark Dery is credited with popularizing the term "cyberpunk." In recognition of this achievement the book's editors bestowed upon him one of cyberculture's most valued forms of capital: making his name a "hot word," linked to an equally hot description of his significance as a writer "on the cyber scene." In *Flame Wars* Dery declares his ambivalence to this citation and, happily, frames this discourse of cyberculture in critical terms, as opposed to the more familiar rhetoric of ecstasy. It's fitting that the first essay, by Vivian Sobchack, is a critique of *Mondo 2000*, the hip new edge 'zine that shaped the contours of much of the discussion about cyberculture. *Mondo 2000* did a lot to generate the cyberphilia (take anything and bung 'cyber' in front of it) gripping anyone who has anything to do with computers, modems and William Gibson novels. The inevitable hype surrounding our changing cultural conditions has meant that far-fetched claims and forecasts about the technocultural future have come to rival, and even overwrite, informed perceptions of the virtual geography we currently inhabit. To this end, Dery has assembled writers with considerable experience of cyberculture as *lived* experience beyond,

in Sobchack's terms, "bumper-sticker libertarianism."

To speak of a "discourse" of cyberculture will alienate many, smacking as it does of critical theory, Michel Foucault and academic practice removed from the lived hyper-realities of the everyday. It's always striking to see how the discourse of cyberculture is inflected with the received ideas (and posturings) of adversarial forms of social and cultural criticism, such as feminism, gay politics and deconstruction, which seem to have set their sights on new sites in the virtual community (Dery's regular column in *Mondo 2000* was called "Guerrilla Semiotics"). Subcultural practices such as "billboard banditry" and "media hoaxing" (aka "culture jamming") continue the Situationist tradition of *détournement*, but they are also charged with the disgust of a generation weary of the power of electronic media over the significations we occupy.

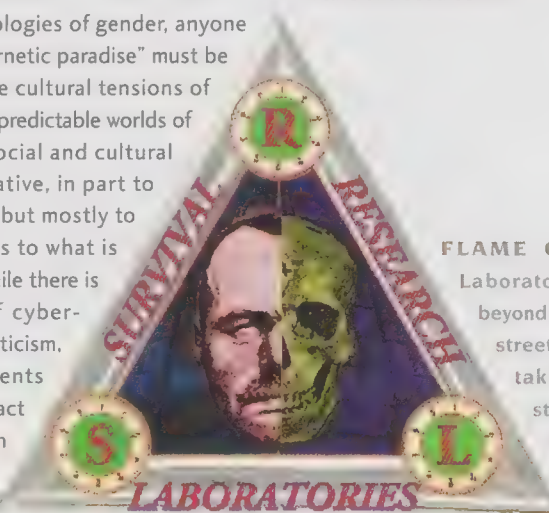
As Dery notes in his fine monograph *Culture Jamming*, interventionist tampering with the empire of signs may or may not be theoretically informed, but it is intuitively aware of the "networks of power, the encoded messages that flicker ceaselessly along its communication channels." Members of the BLO (Barbie Liberation Organization) might not have their Derrida down pat, but the impact of a shop-till-you-drop GI Joe can produce powerful, defamiliarizing effects.

As Claudia Springer points out in her *Flame Wars* essay on feminist technologies of gender, anyone thinking about the "cybernetic paradise" must be concerned with "how the cultural tensions of today will unfold in the unpredictable worlds of tomorrow." Emergent social and cultural formations need a narrative, in part to locate them historically, but mostly to orient their participants to what is going on in the world. While there is a thriving discourse of cyberculture within cultural criticism, many of the key statements that constitute it did in fact emerge out of the hi-tech industrial culture it seeks to articulate. As sci-fi

author Samuel Delany points out in his interview with Dery in *Flame Wars*, William Gibson's talismanic line, "The street finds its own uses for things" was quickly adopted as a "slogan for the cyberpunk sensibility." This "strechnological" imperative runs throughout the essays in *Flame Wars* and accounts for its mixture of political engagement (Afrofuturism, angry women), erotica (compusex) and techno-fetishism (Survival Research Laboratories; Gibson's apocalyptic book of loss, *Agrippa*). There is a good deal of cyberpunk fiction represented too, such as Pat Cadigan's futuristic story of immersive entertainment, *Synners*; the work of Marc Laidlaw; and a fascinating Samuel Delany interview.

The breadth and complexity of cyberculture is represented here, along with its tensions, defining myths (Gibson's typewriter) and scandals (the infamous "Mr Bungle" incident). Julian Dibbell's compelling account of the Mr Bungle affair is typical of the book's interactive focus, as is Gareth Branwyn's lively portrait of the on-line Kama Sutra set. Such essays document the gritty, hardcore conditions of life in virtual communities. They make it difficult, though, to re-focus attention on scholarly discussions of the pre-history of cyberspace and the emergence of synthetic reason, which seem flat, even *de trop*, in their current context.

Flame Wars will fall short of being all things to all readers interested in cyberculture, but hey, that's the nature of discourse. ♣



FLAME ON: Survival Research Laboratories have taken flaming beyond the computer and into the street. SRL's Mark Pauline has taken Gibson's quote "the street finds its own use for things" into a literal realm of robotics, explosions and performance.



SEX SELLS. HISTORY'S MOST COMMERCIAL SUCCESSFUL PRODUCT IS HELPING FOUR YOUNG SOFTWARE ENTREPRENEURS STAKE THEIR PLACE IN THE COMPETITIVE WORLD OF INTERACTIVE CD-ROMS.

basic interactive: hardcore software

BY PIPPA LEARY

Sex and science fiction are a potent and provocative combination. For four young college graduates attempting to compete with the major communications companies in the emerging industry of multimedia, this potent combination may provide the perfect ingredients for the David and Goliath story that is New Machine Publishing.

New Machine is about as far from the hi-tech world of Silicon Valley as you can get. Situated on the industrial flats of Santa Monica, their offices have no windows and resemble an inner-city warehouse. Apart from the banks of computers and editing suites, there is no visible sign that this is a modern-day porn factory. In fact it resembles the innocent mess of a teenager bedroom – innocent enough until you look under the bed and find the piles of *Penthouse*.

This is not Microsoft, but it's where all the action is taking place. Porn is happening in places like these, not in the giants, such as Time/Warner or Fox, that first explored some of the more interesting niches of the Digital Age. And as with almost every other new technology that has hit the market, the group's contribution has been successful precisely *because* they deal in sex, not in spite of it. From the hyper-real violence of *Mortal Kombat* and *Final Fight* ("leave no face unbroken!") to the questionable antics of *Leisure Suit Larry* and the soft-porn fantasies of *Mac-Playmate*, the world of video games has always been designed by the boys, for the boys, and in the emerging world of CD-ROM, it looks as though things will be no different.

The New Machine story started back in 1992 when four college graduates got together and decided to

ride the wave of the information age. Virtual sex was not the first thing that came to mind – a kind of Eco-Utopia was. "At first we thought we'd do a CD-ROM on the rainforest," says Larry Miller, one of its founders. "It was gonna be interactive, have bird calls, native music, all that stuff. Then we discovered we were not thinking in real-world terms. No one would have bought it."

Part of the hype that surrounds multimedia is its saleability. And Miller was right. Of the thousands of CD-ROMs on the market, only a handful actually make money. And there are no prizes for guessing which ones.

Deciding to get real, they came across the idea of interactive strip poker and, while investigating this avenue, made the discovery that no one had yet created a porn CD-ROM which combined live actors and interactivity. This sounded easy in theory. But as with all great ideas, the execution proved a far sight harder. Nonetheless, the four guys bunkered down and, in the spirit of Steven P. Jobs and Steve Wozniak (founders of Apple), they embarked on the classic, garage start-up.

They were eating out of cans, they tossed the bed aside to make space for a couple of used Macintoshes. Of the four, only two actually knew anything about computers, but undaunted by the technology, they taught themselves. They tried, they failed, finally they got it right.

Learning how to make the computers work turned out to be the least of their problems. If they were going to create porn for CD-ROM, they needed not only computers, but cameras, lights and action. Being middle-class college boys these rookie porn-meisters didn't know any women, let alone men, who would do *that thing* in front of the camera. Then it dawned on them – why not just buy old footage from a real porn producer and convert it to the digital language of the CD-ROM. They found a producer and were soon the proud owners of a collection of totally unassociated sex scenes.

As always, necessity acted as the mother of invention, and they turned the formulaic quality of the scenes to their advantage. All the footage took place either on the beach or in hotel rooms, so they created a tale that could accommodate the locations, and



EXPLOITING THE FORMAT: Triple-X CD-ROMs like *Dream Machine* use essentially the same technology as the leading interactive games from major companies like Time Warner. The advantages that arise from these technologies is a more active role in your fantasies – as the porn-meisters promise.

For literally hundreds of years, the first to experiment with any new communication breakthrough have included those peddling sex.

The pornography people have gotten what they want, which is a more vivid way to portray sex. And the technology has benefited from their experimentation. The need for innovation in pornography is so great that it usually gets to a new medium first which finds out what can be done and what can't."

Nightwatch was created. Their lack of technical knowledge is evident, with the film playing at the jerky speed of five frames per second due to the fact that they did not understand how to use the digitizer.

The viewer starts by entering an apartment complex at the beach and encounters a blonde nymphet nightguard watching a bank of monitors controlling cameras that watch over the building, including a few in "secret places." At first she takes off her shoes and asks if it's alright if she takes off her shirt. The screen flashes two responses: "Take off shirt," and "Keep It On." If the viewer clicks on Take Off, she whisks it off and says, gratefully, "that's better."

Watching *Nightwatch* today, especially after watching *Dream Machine*, *The Adventures of Seymour Butts* and *Nightwatch II*, is to understand how crude the initial attempts to exploit a technology can be. It's kind of like being time-warped back to the turn of the century and seeing the first moving pictures. The video sequences jerk along, the 'story' exists in only the crudest sense, and the interactivity operates at an imbecilic level.

But these young men had confidence in their creation. They recognized that the future of interactivity and porn lies in the close relationship between fantasy and control. What the sex industry has been selling all these years is the masculine fantasy of total control – but the one-sidedness of this fantasy is hard to maintain in real-life interaction. At last, here was the technology that could deliver the bodacious babes who didn't complain, want more money or answer back. It wasn't quite virtual sex, but it was a step in the right direction. As Miller points out, interactivity creates a feeling of being in charge, rather than just being a passive observer: "It's being able to take an active role in your fantasies, so you can feel closer to it." All you have to do is stick your disk into the driver. Then you pick and choose. This was the jewel in the multimedia crown. On a budget of next-to-nothing, these boys had nurtured their product just enough to demonstrate its potential.

The next hurdle facing our intrepid heroes was distribution. But, as technological innovators have found for centuries, you can sell pornography in a new

technological form before you can sell mainstream applications. The major studios of Hollywood, for example, have yet to produce a feature that allows a viewer to influence the story as they watch. No one knows if enough people would pay to watch such a movie, and as finding the answer requires such a huge

booth. In four days they sold all 500 disks retailing at US\$59.95 each. Over the weekend they quadrupled their initial investment of US\$7,000. In the following months *Nightwatch* became both a bestseller among adult CD-ROMs and the infamous sensation of the computer world.



ON GUARD: Adult entertainment meets childish TV prompts in *Nightwatch*. A bored security guard asks the viewer whether she should take off her bra and, before you can say it's a bust, the icon "adios silly bra" appears. The technology may be crude but this is where it all started for New Machine Publishing. As with most adult CD-ROMs a panic button is installed to avoid detection.

investment, the studios have hung back. In a similar way, the big studios involved in the adult market don't usually have the kind of long-term vision that investment in R&D requires, especially for a format like CD-ROM. It takes the small guys, the hungry ones sniffing around the edges, to combine the elements.

Says Miller of this combination of sex and science: "We realized the important part was technology. We could take a CD-ROM and do things with the sex footage that no one could do with video and that was the point. Exploiting the format."

As in the early days of video, they needed to target their market exactly. In this case, it was people, usually white males, who owned CD-ROM players. Five weeks later, after *Nightwatch* was finished, they took it to the MacWorld convention in San Francisco. As they had expected, one of the largest conventions for Mac users offered them a parade of "sex-starved nerds," fighting to get into their booth. At that first convention they were forced to cover up their product by building a wall around it. All this did was create the old 'concealed/revealed' effect that goes hand-in-hand with sex and censorship in Western culture. Before long, huge lines began forming in front of the New Machine

For literally hundreds of years, the first to experiment with any new communication breakthrough have included those peddling sex. Whether it be the printing press or the photograph, pornographers have exploited technology for their own purposes and, in so doing, expanded these media.

When Gutenberg began printing Bibles on his press in the mid-15th century, rival printers put out an illustrated guide to lovemaking that Pope Clement VII tried, unsuccessfully, to suppress. The 19th century ushered in the capability for mass reproduction and so the dirty postcard craze was born. In the twilight years of the century, some 600 million postcards were sold in France alone.

By the turn of the century, the overwhelming demand for ever-more lifelike images of naked female flesh gave rise to another form of visual reproduction. Dimehalls and nickelodeons catered to the erotic tastes of working-class men who, for a small price, could view moving "naughties" through the stereoscopic "bioscope." The bioscope gave way to the moving picture. Even Thomas Edison found himself lured into the soft-porn realm when he released one of his first movies. *The Kiss*.



SPOOF: Emulating the successes of adult videos, CD-ROMs like *The Muppet Family* have spoofed many popular films.

"If you look at the history of pornography and new technologies, the track record has been pretty good," says Walter Kendrick, author of *The Secret Museum: Pornography in Modern Culture*. "Usually everyone comes out ahead. The pornography people have gotten what they want, which is a more vivid way to portray sex. And the technology has benefited from their experimentation. The need for innovation in pornography is so great that it usually gets to a new medium first, which finds out what can be done and what can't."

Nothing if not innovative, New Machine have not only explored, they've played with the medium. Mindful of their core audience, New Machine have installed what is called the "Office/Wife Panic Button," where if your boss walks in, the screen transforms into a fake work-station. This reflects a knowledge of their audience and the context in which it is playing CD-ROMs. Up until recently, most CD-ROM players were found in offices rather than private homes. The Office/Wife Panic Button also points to the gender-specific nature of New Machine's audience. The audience for both porn and CD-ROM is overwhelmingly male – no longer entirely geek, but definitely male. As we sit watching footage from *Nightwatch II*, Disreality is clearly uncomfortable, but, as he explains, women are not the target audience. Sitting in the New Machine offices it's clear that this is a boy's own world, and it's unsurprising that many of the new technology applications are obsessed with the female body in a manner not unlike the soft-porn of certain men's magazines.

Of course, these are just games, but it's interesting, especially in the emerging world of electronic technologies, how the little-boys' toys have turned into the big-boys' toys and the masculine mystique continues to bar women from the testosterone zone. At the recent E3 (Electronic Entertainment Expo) one of the most hotly debated seminars was titled "The Female Demographic: Untapped Riches or Impossible Market." Professor Marsha Kinder, who runs a course in interactivity and narrativity at the University of Southern California, argued that while CD-ROM and other aspects of computer culture are an extension of a culture where men are already in control of the hardware, the masculine nature of this space is in no way inevitable. As long as the games and applications are about empowerment in a way that is related exclusively to masculinity (i.e. sex and violence) they will remain boys' toys. However, she argues, as this industry conflates with the movie industry for economic reasons it will have to broaden its demographics in terms of both age and gender. The crucial element at this point will be the kind of women who become involved in the design process. If they continue to define women's pleasure in ways that are traditionally feminine (dressing up and dating men) then a kind of gendered split will ensue. On the other hand, if work is done on games that explore spaces in ways that are not coded as either male or female then the kind of product-splitting we presently see in the marking of 'boys' and 'girls' aisles in Toys R Us, may not occur.

To walk around the Expo which showcased literally thousands of CD-ROM products, the Toys R Us marketing model was certainly still dominant. To attract male customers (assumed to be the only customers), vendors like Sega and Nintendo had created 'boys' own' mini-cities where blondes in skintight leotards did the high-kicking 'Killer Instinct' dance every half hour or so. Akkclaim, marketing the new *Batman* and *Judge Dredd* interactives, had busty BatGirls at the ready for photo opportunities. Besides hired models and buffy PR girls, the female presence (as buyers) was negligible. Disappointing as it is, the gender-biased nature of the Expo demonstrates clearly why CD-ROM porn has been so successful. Male consumers dominate both computer and porn markets – and it doesn't take much imagination to bring them together, that's why so many people are rushing to do it.

When New Machine started out in 1992, it had less than a handful of competitors. Now Todd Disraeli, head of marketing, estimates there to be more than 200 companies in the market. The programs they supply run the gamut from still photos of naked bodies to full-length hardcore porn. While this software is titillating viewers, many mainstream multimedia executives are doubtful that these titles alone will propel a large-scale purchase of CD-ROM players. Those in the adult multimedia industry beg to differ. They point out how in 1978, for example, fewer than 1 per cent of American homes had VCRs, but more than 75 per cent of the video-cassettes sold for these machines were pornographic.

According to Mark Media of Pixis Entertainment, producers of the CD-ROM titles *Virtual Vixens* and *Scissors 'N' Stones*, the same sort of trend is occurring in the CD-ROM market. "Lust motivates technology, whether it's cave paintings or drawings, paintings or photographs. What we've created is nothing new, but it's done in a new way." This view is supported by Virgin Megastore vice-president of operations, Steve Hamilton. "The adult titles were almost half of our CD-ROM business last year. The adult product was what drove the videotape industry and started the ball rolling. Adult CD-ROM is showing similarities."

"Lust motivates technology, whether it's
cave paintings or drawings, paintings or photographs.
What we've created is nothing new,
but it's done in a new way."



It was the introduction in the early '90s of QuickTime, a technology that allows for video playback on computer, that set the wheels in motion for the adult material to be released. And although many are under the mistaken impression that the first QuickTime computer movie was the Beatles' *A Hard Day's Night*, in reality that distinction belongs to *House of Dreams*, a film from well-known porn-meister Andrew Blake.

But not everyone is convinced that this new style of porn will be the sales Nirvana that many in the industry believe. "It's software for guys who can't get a date," argues Peter Black of Xiphias, the company that recently produced the CD-ROM version of the children's title *Mighty Morphin' Power Rangers*. "It won't be as significant as what it was on video. It doesn't play the same role. We're in a moment where it's making the transition from a geek business to a consumer business. As it becomes more of a consumer business, classic entertainment will be more and more important, and the adult titles will be less important."

Black says the analogy between CD-ROMs and videos isn't valid. He also notes that prior to VCRs and video porn there was no way to see adult titles other than going to a dingy theater and usually sitting next to somebody wearing a raincoat. The availability of video porn offered privacy; computerized versions don't really offer much more. "What sells now is novelty," says Black. "And these porn titles fall into the category of novelty."

While Black may write interactivity off as novelty, it does seem to be proving otherwise with the market. And at New Machine they plan to exploit interactivity to the hilt. Says Disraeli: "Hopefully, if it's ever allowed in the States, we want to create some kind of video-phone system. We're using all the technology and the platforms we have to explore this area and we have a lot of ideas. Right now all you have is cameras mounted on the monitor – if we can implement this with two people and create some kind of on-line network, then we'll really have something."

What Disraeli envisages is something like video-phone sex or an on-line video peep show. While the format of end-user to end-user is easy to imagine, the video peep show would mean the end of a phone-sex

industry exploited by thousands of women who don't resemble pneumatic Barbies, but can make it sound like they do. For the present, however, New Machine's focus remains exploring technological innovation in the CD-ROM/game format. Disraeli informs me that the new generation of product – *Nightwatch III*, *Dream Machine II* and *Seymore II* – will all use the same type of technology as Time/Warner's leading interactive games. Not only has the profit from their early ventures allowed New Machine to purchase Silicon Graphic machines (the machines used to create the dinosaurs in *Jurassic Park*) but also *Doom*-type engines and thought-process engines. This technology allows the CD-ROM to make informed choices about the player. As Disraeli points out, "If you answer a certain kind of way a certain amount of times, it means you're into kinky stuff. From your answers the program will decide whether you're kinky or a mellow conservative type." While in the porn format this means the game will be more able to please you, in other formats the inclusion of thought-process technology means that games will become more challenging, as the 'thinking engine' attempts to outsmart you.

Beyond re-investing in more of the same, the financial success of New Machine has allowed some of its original founders to leave the porn side of the industry and take up where they started – back in the rainforest. Larry Miller has broken away to form Electromedia, the company through which he produces *GoDigital*, a quarterly CD-ROM magazine that covers all aspects of the digital revolution in a digital format. The inaugural issue includes reviews of new technology, game and album reviews, interviews with George Lucas and Timothy Leary, and Baudsquad – an update of on-line action.

Electromedia has also started a company called *The Interactivist* which attempts to demonstrate how the Internet can be used to battle what, to many of us, seems the overwhelming power of information-rich organizations like multinationals and governments. Says Miller: "We're trying to get people to feel that the problems in the world that they'd like to do something about aren't completely out of hand. We want to show people how to use the power of the Internet to send e-



CYBERPORN: With "Touch and Feel User Interface" the manufacturers of *Neurodancer* encourage you to "Hack into the forbidden world of dark mystery, danger and sensuality."

mail to senators and congressmen, to join organizations, to find information, or to simply locate ancillary groups that fight the same causes." *The Interactivist*, which has its own section in *GoDigital* and its own Web site, reflects its founders' backgrounds far more than does the content of New Machine. One of the home pages, the "Earth Market Place," links buyers and sellers of sustainable products. In an indirect way they're finally making that rainforest CD.

Along with *GoDigital* and *The Interactivist* Electromedia hopes to develop a host of on-line Web services like a 'chat' service that allows users to chat 'realtime' on the Web. "We'll also have forums with some of the centerfolds and some of the luminaries that we interview," adds Miller. "We may also broadcast concerts. What we really want to do is exploit the potential of the Internet. For example, in the not-so-distant future, virtual reality in multi-use environments will be Internet based. We're moving towards the use of VRML, or Virtual Reality Modeling Language, which is a language Web programmers can use to create immersive virtual reality-type environments. It's really cool – instead of seeing just flat images, you go forward and zoom through a virtual environment. We're hoping to set this up for *GoDigital*." When I ask how they plan to make money off a Web site, Miller laughs. "That's the question everyone's asking. The answer is to merchandize your products. *GoDigital* has a Web site but it's only a teaser – a preview of what's on the CD-ROM." The idea is that potential buyers will click on to it on the Net, like what they see, and then pay US\$15.95 for the whole product. Miller has, however, learnt his lessons about the real world. *GoDigital* comes in both PG and Full Nudity versions. And he's the first to admit that while we'd like to hope that it's the idealism of *The Interactivist* that sells, the bottom line is that it's the nudity that moves *GoDigital* from the shelves. ■

P A N I C



ABOUT WRITE

Fred Harden is a regular columnist for 21•C and the editor of on-line magazine *MultiMedia*.

TRIPS 'N' CHIPS

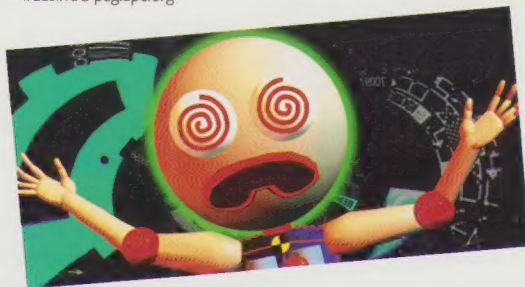
R.U. Sirius is co-founder of the cyberculture magazine *Mondo 2000*. He writes a monthly column for *Esquire* (Japan) and *Wave* magazines, and is a contributing editor to *Wired*, *Mondo 2000*, *Might* and *BOING BOING* magazines. He has recently completed two books with St Jude: *How to Mutate and Take Over the World* (Ballantine) and *The Real Cyberpunk Fake Book* (Random House).

GREPPING THE FUTURE

McKenzie Wark's last story for 21•C was an interview with cultural theorist Andrew Ross.

NET PROPHET

Wilson da Silva is a Melbourne-based contributing editor to 21•C and a feature writer for *The Sunday Age* and *Canberra Times* newspapers. He was formerly a foreign correspondent for Reuters and the founding managing editor of the international magazine *Science Spectra*.
<wdasilva@peg.apc.org>



TRASH THEORY

Nick Marinello is a senior editor in the Office of University Publications at Tulane University, New Orleans.

'WHETHER ORLAN'S SURGICAL PERFORMANCES ARE CARNAL ART OR CARNIVAL ART IS A MATTER OF HEATED DEBATE'

AGAINST NATURE

Mark Dery is a New York-based cultural critic. He edited *Flame Wars: The Discourse of Cyberculture* (Duke University Press, 1995). His inquiry into fringe computer culture, *Escape Velocity: Cyberculture at the End of the Century*, will be published by Grove-Atlantic this year. His last story for 21•C was a discussion with Mark Pauline and Manuel de Landa.
<markdery@well.sf.ca.us>

CITY ON-LINE

Shuschen Tan is an Amsterdam-based writer. A version of her article on digital cities appeared in the on-line magazine *C-THEORY*.

CYBEROPTICS

Julian Brown is a London-based science writer, a former BBC journalist and editor of the British science magazine *Focus*. His last story for 21•C was a profile of Francis Crick.

BLACK THUNDER

McKenzie Wark is the author of *Virtual Geography: Living With Global Media Events* (Indiana University Press). He lectures at Macquarie University in Sydney, and is a columnist for *The Australian* newspaper, which, he says, makes him a "lapsed Marxist in the pay of Rupert Murdoch." His writings have appeared in *New Statesman*, *New Formations*, *Cultural Studies* and *World Art* magazines.
<McKenzie.Wark@mq.edu.au>

CONSPIRACY USA

Rosie Cross is a Sydney-based freelance radio producer, writer, video-maker and publisher of the techno-fanzine *Geek Girl*. Her last story for 21•C was an interview with Kathy Acker.
<rosieX@jolt.mpx.com.au>

AUMAGEDDON

Azby Brown is associate professor of architectural design at Kanazawa Institute of Technology, Japan. His books, *The Genesis of Japanese Carpentry* and *Small Spaces*, are published by Kodansha International. His last story for 21•C was a profile of software author Kai Krause.

PLAGUE FEARS/OUTBREAK OUTBACK

Wilson da Silva's last story for 21•C was on the search for extraterrestrial intelligence.

THE ACCIDENTAL IMPACT

Paul Davies is professor of natural philosophy at the University of Adelaide and author of more than 20 popular science books. His latest book is *The Last Three Minutes* (Weidenfeld & Nicolson). His last story for 21•C was on Complexity.

'What if everything we take for reality is merely a stage set, an empty mirage or a projection of one's own mind?

Or worse, of someone else's?'



DREAMING OF ELECTRIC SHEEP

George Melrod writes frequently, from New York, about contemporary art and culture. He recently adapted Philip K. Dick's novel *The Three Stigmata of Palmer Eldritch* to a screenplay for Francis Ford Coppola's American Zoetrope Films.

DISABILITY

Adam L. Penenberg is a New York-based writer and contributor for *The New York Times*. His last story for 21•C was an analysis of the likely global impact of a major earthquake hitting Tokyo.

BASIC INTERACTIVE

Pippa Leary is a Los Angeles-based writer.

ILLUSTRATORS

Commissioned illustrations in this issue were by **Gregory Baldwin**, **Ian Haig**, **Troy Innocent**, **Murray McKeich**, **Greg O'Connor**, **Jon Paton**, **Elena Popa**, **Noel Richards** (n squared), **Norm Robinson**, **Assunta Russo**, **Christopher Waller** and **James Widdowson**.

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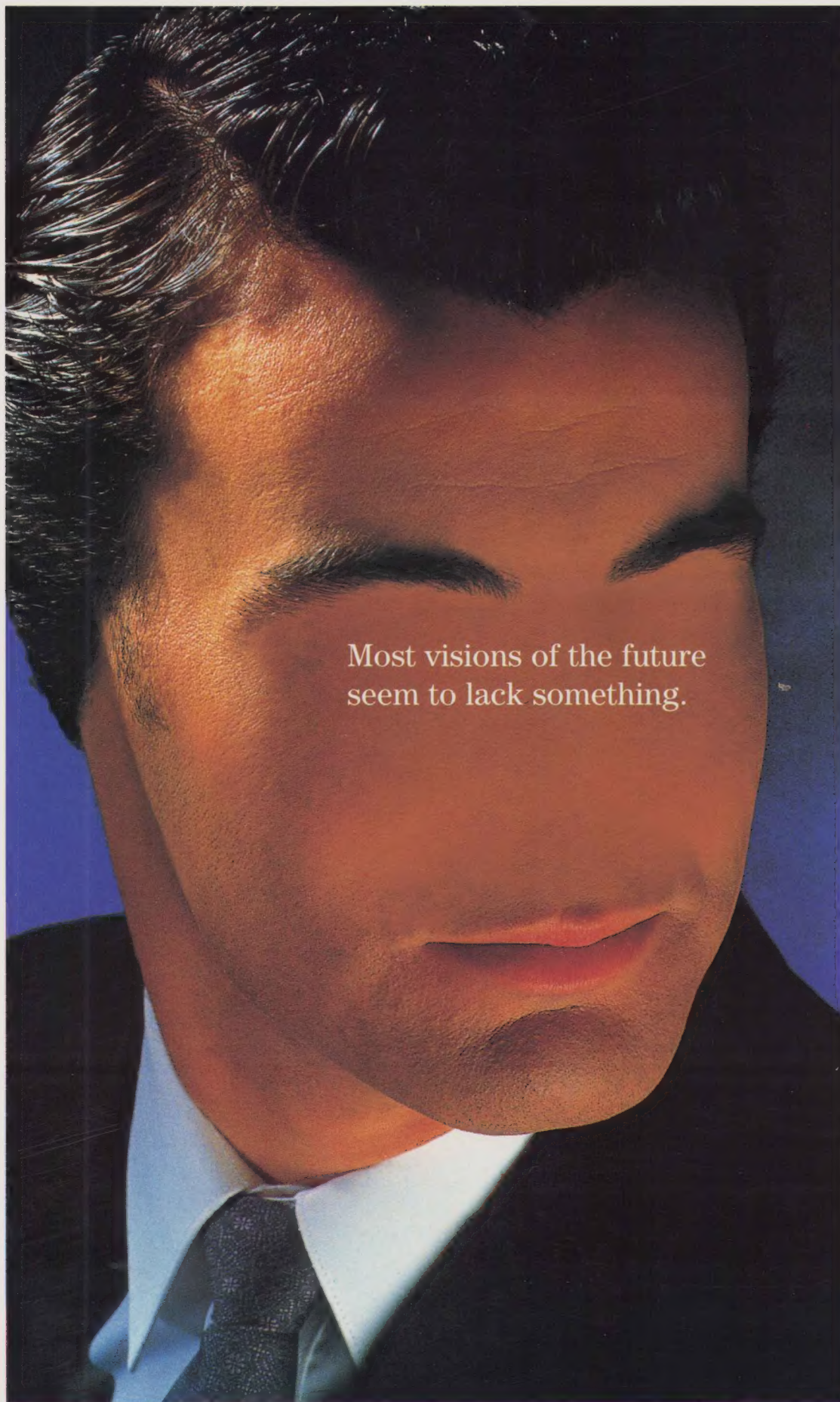
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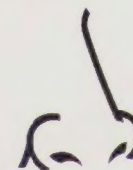
When people imagine some future technological time, they only ever seem to think of computers. Oh, and maybe communications. And that's it.



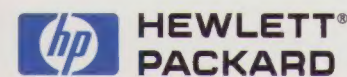
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